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CHARACTERISTICS OF COLLEGE-AGE GIFTED

by



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ABSTRACT

This study was designed to compare gifted college-age youth with average population groups on factors related to background characteristics (such as religion and socio-economic status), scholastic achievement, and personality traits.

The sample consisted of two hundred subjects randomly selected from all 1967 Edmonton grade twelve students whose scores on a group intelligence test (the Co-operative School and College Ability Test) were above the ninetieth percentile for the Alberta distribution. Data concerning background characteristics were collected through telephone interviews and questionnaires. Educational data were obtained from the records of the Alberta Department of Education and the University of Alberta. Personality data were obtained from California Psychological Inventories administered to a smaller group randomly selected from the sample of gifted individuals. Differences between sample and population values were tested by means of chi-square and z-tests.

It was found that the gifted subjects differed from average population groups on a large number of variables. The greatest differences for background variables were in the higher than average values for

subjects in socio-economic status and in parental education. In addition, the distribution of subjects by religious affiliation, ethnic origin, and enrolment in public or separate schools, showed significant differences from population distributions.

On the major measures of educational achievement (first year and 1970 university grades) both the distributions and the means of grades for gifted students differed from values for the student population in general. Means for subjects were slightly higher in both cases, but the differences between means were small: less than .3 stanine points in both cases.

Significant differences between means for subjects and college norms were found for a large number of CPI scales. Male subjects scored significantly lower (i.e. less well-adjusted) on nine of the eighteen scales; significantly higher on only one. Female subjects scored significantly lower on ten of the scales; significantly higher on two.

The findings were discussed in relation to the traditional conclusions regarding intellectual giftedness; and in particular to those conclusions reached by Lewis Terman and his associates.

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CHAPTER I

INTRODUCTION

The education of talented students has been a concern of societies since the beginning of formal education. Plato argued that gifted youth should be specially educated to become the leaders of the next generation. Modern thinking echoes this early plan. Today's writers stress the necessity of developing the talents of gifted young people so that they may solve the problems of our technological age, and contribute to the quality of life in general. In the opinion of White:

. . . it is extremely important that our culture make the best use of these people once they are identified and educated. Such strategy would place gifted individuals in a prestige position in our society and make it possible for them to exert the leadership and ingenuity which is their natural heritage (1970, p.161).

All writers appear to agree about the value to a society of developing the talents of its gifted young people. Yet there is little agreement as to how this should be done, or whether it is being done at present. Many authorities believe that gifted

children and adolescents learn successfully and adjust well without any special help in the process, while others argue that our present methods of educating the gifted result in a tragically large talent loss. Still others believe that the term "gifted," as presently used in educational circles, is meaningless and valueless.

Educational planning for any group of students is based upon educators' knowledge of the characteristics of that group. In order to plan wisely for the development of gifted students, educators must have the answers to several important questions: Who are the gifted? Do they comprise a distinct group with valuable skills to contribute to our society? If so, what is distinctive about this group of students? What personal, social, and achievement differences, if any, distinguish them from the run-of-the-mill student? What are the relationships among such characteristics?

This project was designed to explore the answers to these questions through a study of two hundred Edmonton students considered gifted according to current educational thought.

Concept of Giftedness

Few terms in educational psychology are more ambiguous than the term "gifted." Authorities vaguely agree that the gifted are those with special valuable "skills" to contribute to society. Valuable contributions are variously considered to be scientific or technical advances, literary publications, musical or artistic achievements, or the occupation of high-ranking positions in law, government, business, or industry. According to this thinking, the gifted are "those whose performance in a potentially valuable line of human activity is consistently remarkable (Witty, in French, 1967, p. 386)." While few would quarrel with definition of giftedness on theoretical grounds, it is far from satisfactory as a practical tool. Giftedness, as defined in this manner, could be identified best through an analysis of his achievements upon the death of a given individual, and could rarely be identified before middle age. This provides little assistance to the teacher who is concerned about the encouragement of the gifted children among her young charges, or to the researcher investigating the incidence of giftedness in a particular high school.

Most authorities restrict the use of the term gifted to those individuals demonstrating some form

of intellectual competence. In accordance with common usage, the concern of this thesis has been restricted to intellectual giftedness rather than dealing with all the different types of giftedness thought to exist (e.g. artistic, musical, mechanical, social). However, the problem of defining giftedness is not solved by the arbitrary decision to restrict its meaning to intellectual factors, for great differences of opinion exist even within this limited framework. An example is Newland's suggestion that the gifted be considered ". . . those needed by society to perform higher level conceptualizations and generalizations in various occupational fields (1963, p. 393)." As in the case of Witty's definition, while it may be of great theoretical or philosophical value, it is too unwieldly and subjective to be used in research or practical situations. It must be translated into operational terms for actual use in identifying gifted students.

Instruments for the assessment of giftedness usually take one of three forms: scholastic achievement tests; intelligence, aptitude, or scholastic ability tests; or the newer creativity tests. The first indicator of giftedness, scholastic achievement, is not popular, since giftedness is generally considered, at least in children and in adolescents, as the poten-

tial for achievement rather than the achievement itself. The recently developed tests of creative thinking have shown promise when used in laboratory schools, but in more traditional school settings their predictive validities were found to be low (Gallagher, 1964). At any rate, creativity tests have not yet proved their effectiveness as indicators of superior potential for achievement (Gallagher, 1964).

By a process of elimination then, a high score on the traditional I.Q. test remains at present the best indicator of intellectual giftedness. It must be emphasized that the decision to use this measurement tool as the criterion of giftedness for this study has been made, not because of the desirability of the I.Q. test as a measure of giftedness, but because of the lack of a more adequate measure.

The problem of defining "high" still remains: how high must an I.Q. score be before an individual earns the label "gifted"? The answer, for this thesis, is a compromise: a middle-of-the-road definition that is acceptable to a large number of the experts on giftedness. It is a definition suggested by Gallagher in 1964. "Giftedness" is considered to refer to those individuals with scores of 132 or higher, a definition which includes two percent of an average community or

six to ten percent of a high socio-economic area. In the research associated with this study, giftedness has been defined as a score on a group intelligence test above the ninetieth percentile for Alberta grade twelve students; a score which would place an individual in the top two to five percent of the general population.* The test used is the Co-operative School and College Ability Test (SCAT) which was administered to all Alberta grade twelve students in January of 1967. It is described in some detail in Chapter III in the section titled "Research Instruments."

In the review of the literature which follows, "gifted" cannot be used in such a specific sense. The majority of the studies to be discussed have used high scores (i.e. above I.Q. 125) on intelligence tests as the criterion of giftedness, but both the tests used and the ranges of scores required vary considerably from one study to another. These variations must be kept in mind in considering the results and conclusions of the various studies.

*See Appendix A for a justification of this statement.

Present Knowledge of Giftedness

The following summaries by two authorities in the field provide an introduction to current thinking regarding giftedness:

Specifically, we should expect to find any such gifted group superior to unselected children of equal age in the following respects: they would have a much larger proportion of near relatives who had achieved notably more than ordinary men and women achieve; they would be slightly superior to average children in health and physique; their mean educational achievement, however measured, would be vastly superior to that of unselected children; the amount of unevenness in their abilities would differ very little from that which obtains for children in general; they would be found superior to unselected children in trustworthiness, emotional stability, zeal, social adaptability, leadership, common sense, and almost every other desirable trait of personality or character, though in some of these their superiority would be much less marked than in the intellectual processes (Burks, Jensen, and Terman; 1930, p. 7).

We know a few things about the gifted. Their I.Q. is up above 130. They tend to be stronger, taller, heavier than their less-talented classmates. Contrary to the popular caricature of the bespectacled bookworm, they top their peers in such social graces as popularity and attractiveness, too. Among the mentally as among the financially successful, "them that has, gets" (Rafferty, Superintendent of Public Instruction, California State Department of Education; in Rice, 1970, p. v).

All this seems like a great deal to attribute to the single factor of high intelligence. And yet these are the qualities that most authorities on giftedness expect to find in the typical gifted individual.

On what evidence is this portrait of versatility and superiority based? Close examination reveals that very little empirical evidence exists to support these glowing statements. In order to defend this assertion it is necessary first to examine in some detail those characteristics presently considered typical of gifted individuals, and secondly to analyse critically the research studies upon which the conclusions are based. These tasks have been undertaken in Chapter II.

CHAPTER II

RELATED LITERATURE

This chapter deals with what is presently known (or believed to be known) about certain sociological, academic, and personality correlates of intellectual giftedness. Physical characteristics, such as height, weight and health, are not a topic of concern in this thesis. Concentration is on such factors as sex differences in the incidence of giftedness, socio-economic and ethnic backgrounds of gifted persons, academic achievement of gifted students, and emotional and social adjustments of gifted adolescents. The chapter has been divided into two major sections: the first consisting of the actual review of the literature, and the second dealing with an evaluation of the research on which the literature is based.

Whenever possible, results of Canadian research projects are reported; however, because Canadian studies on giftedness are rare, the majority of evidence comes from the United States. In every case where no country is mentioned, it can be assumed that

the study was done in the United States.

Serious obstacles confront anyone attempting a review of the literature on intellectual giftedness. Determining what is meant by "giftedness" is itself, as already discussed, a difficult task. Another difficulty encountered in reviewing the literature is the vast number of publications in the area. Hall's research, "A Bibliographic Survey of the Education for Gifted Children (University of Alberta, master's thesis, 1957)," unearthed the titles of more than 200 relevant books, articles, and theses. Since 1957 this figure has likely doubled. A separate discussion of each of these publications is, of course, impossible. Instead, where the conclusions of a large number of studies are in agreement, these conclusions are briefly stated; and where conclusions are contradictory, a few of the representative studies are cited.

The discussion which follows is not to be regarded as an exhaustive review of the literature related to giftedness. It is limited in three ways: first, it deals only with the non-physical correlates of giftedness previously mentioned; second, it treats only those studies involving subjects of high school or college age; and third, no attempt has been made to include all the studies which fulfill the preceding two

requirements: the volume of relevant literature is simply too great.

CHARACTERISTICS OF THE GIFTED

Sex. Sex differences in the incidence of giftedness, always in favour of males, have been noted by a number of researchers. In Terman's first large sample, boys outnumbered girls by the significant margin of 115 to 100. Holland's study (1959) of 1321 National Merit Scholarship winners and runners-up revealed considerably higher aptitude test scores among the males than among the females. On the other hand, Bishton (1957) and Dugan (1960) recorded approximately equal numbers of males and females in their gifted samples, although the non-significant differences in each case favoured the males. On the basis of the small quantity of existing data, the conclusion must be that giftedness occurs somewhat more frequently among males.

Religious and ethnic group membership. Since many researchers have included religious affiliation and ethnic group membership in a single variable, results for these factors must be reported together.

In a review of the literature on this topic, Adler (1967) found that most studies mentioning ethnic or religious composition of gifted samples reported disproportionate representation of certain groups. Jews were most consistently mentioned as over-represented, followed by Germans and English-Scottish. Negroes were most consistently reported as under-represented, followed by Portuguese, Italian, Mexican, and American Indian. These conclusions have been supported by other research not included in Adler's review (e.g. Lesser, Fifer, and Clark; 1965). However, Horrall (1957) reported no significant differences from the norm in the religious affiliations of her gifted college subjects.

Socio-economic backgrounds. Conclusive evidence exists to support the assertion that the socio-economic status of gifted individuals is "superior." Numerous research studies (e.g. Terman, 1925; Barbe, 1956; Bishton, 1957; Shechtman, 1960; Greene, 1963; Pearson, 1969) have found that individuals with high intelligence test scores are more frequently from the upper and middle classes than from the lower classes. Associated with this high social class standing, of course, is higher than average family incomes and higher than

average parental educational levels (Terman, 1925; Barbe, 1956). Moreover, gifted individuals themselves, as adults, enjoy much higher than average socio-economic status (Burks et. al., 1930; Terman and Oden, 1947).

Academic achievement. Results from many studies (e.g. Terman, 1925; Barbe, 1956; Horrall, 1957; Beals and Simmons, 1963) indicate that the scholastic achievement of gifted students, as measured by standardized tests of teacher-assigned grades, is markedly higher than local or national norms. Most research findings agree that the superiority of the gifted is most notable in the case of standardized achievement tests, and less striking in the case of locally produced examinations and teacher-assigned grades. However, there is widespread alarm over the amount of underachievement among gifted students. Various authorities (e.g. Wedemeyer, 1953; Passow and Goldberg, 1956; Beals and Simmons, 1963) estimate that from ten to forty percent of gifted students are underachievers; that is, students who consistently achieve less than their intelligence scores indicate they are capable of achieving. Nevertheless, the average grades of gifted students are far higher than the average for

students in general.

The proportion of students who enter college also suggests that the educational attainment of gifted students is far above average. Burks et. al. (1930) reported that 85% of the subjects in the Terman study had begun university, and that 70% had graduated with a bachelor's degree--an astounding finding when compared with the national rate of university graduation at that time: 6%. Dugan (1960) reported 82% university attendance for males and 70% for females in his sample. Barbe (1963) found that 90% of the males and 60% of the females in his gifted sample began university. Levenson (1963) found the percentages of university attenders to be 91% for males and 63% for females. Among the gifted subjects studied by Beals and Simmons (1963), 96% planned to attend college. In all of these studies the incidence of university attendance (or plans for university attendance) is far higher in the gifted sample than in the general population.

Some evidence exists to indicate that these American findings are not applicable to the Canadian situation. Jackson and Fleming, in "Who Goes to University--English Canada" concluded:

We seem to be doing an admirable job of squandering the priceless human resources available to us. In fact it can be argued on the basis

of the fragments of information at hand that we are utilizing to the full the talents of no more than one-third of our academically gifted young men and women (from Porter, 1965, p. 196).

Another Canadian study (Pipher, 1962) indirectly supports this conclusion through its finding that the intelligence test scores of high school students who go on to university differ little from those for students who do not go on to university. The median SCAT score for all grade thirteen students surveyed by Pipher was 306.2; the median for those from this group who later attended university was only slightly higher: 310.1.

Personality factors. There is little agreement among research findings concerning the emotional and social adjustment of the gifted. Assum (1947) found no differences in aptitude scores between college students requesting counselling and a matched group not requesting counselling. Smith (1962) found no significant differences in scores on a battery of personality and adjustment measures between his gifted group and his average high school subjects. Getzels and Jackson (1958) studied the relation between I.Q. and personality factors among 533 grade six to grade twelve students at a private school, and obtained correlations ranging from $-.56$ to $+.56$, with a mean of $.04$. Shechtman

(1960) found that her gifted women subjects failed to demonstrate the predicted superiority in California Psychological Inventory measures of social presence, responsibility, and dominance; although they were significantly higher on four other scales of a total of eighteen: tolerance, social status, intellectual efficiency, and self-acceptance. Sheldon (1963), with a small and probably unrepresentative sample, tentatively concluded that an extremely high I.Q. may even be a handicap so far as adjustment is concerned. Several others (e.g. Hollingworth, 1927; Bishton, 1957; Davie, 1961; Levinson, 1961) consider that the social relations of highly gifted individuals may be less satisfactory than average. As Levinson (1961) concludes:

. . . it must be reiterated that, from the vantage point of the clinician, the 'gift' of the 'extremely gifted' is indeed a questionable one. Our observations have indicated that generally the superior intelligence of the extremely gifted child is of little help to him in solving his problems. Neither can he receive help in most cases, from his not so gifted parents and contemporaries, who see his problems in light of their own needs rather than his (p. 88).

However, the commonly accepted belief is that gifted individuals, from childhood to old age, are more contented, more emotionally stable, and more socially competent. This conclusion is supported by

the Terman studies, by Liddle's 1958 study of children of high intelligence, by Levenson's 1963 research on the self-ratings of graduates from a special program for gifted pupils in Cleveland, and by many others. Hollingworth and Rust (1937), studying 45 gifted adolescents, found evidence of superior adjustment on several personality test scales (reported in Smith, 1962). Ramashan (1957) found that his gifted subjects scored higher than controls in social adjustment as rated by teachers and as measured by a social adjustment inventory (Smith, 1962). Gallagher (1963) wrote of the "clear and unambiguous" conclusion recent reviews of the literature have reached regarding the social relations of the gifted: "The more intelligent the child, the more likely it is that he will be socially popular and accepted (p. 42)."

Participation in school and community activities.

The findings of the Terman studies indicate very successful adjustment in this area. Terman's subjects, from childhood to middle age, took an active part in school and community affairs, with high rates of participation in sports, political, cultural, and religious activities (e.g. Terman and Oden, 1947; 1959).

Other researchers have not reported such high rates of participation. Beals and Simmons (1963) concluded that their gifted high school subjects participated in "many" extra-curricular activities (no specific data were reported), but few were members of athletic teams. Bishton (1957) described a lesser than average interest in sports on the part of his eighth grade gifted subjects. No significant differences in participation in community and social activities were found by Shechtman (1960) in her comparison of gifted and average women. Still less positive in view of current attitudes was Davie's report (1961) of less frequent membership in fraternities and athletic teams and of infrequent dating among the highly superior Yale undergraduates he studied.

Leadership abilities. On the basis of teacher and parent ratings and tallies of offices held, Terman's studies credited the typical gifted person with better than average leadership ability. This conclusion is supported by the more recent research of Shechtman (1960) which concluded that significantly more of the gifted than of the average subjects in her study held positions of leadership in school and in college. However, these findings are contradicted by a 1963 study

by Beals and Simmons. Although they did not report the the relevant data, they concluded that very few of those in their sample of gifted high school students held important leadership positions.

Vocational plans. Data on this topic are very limited. Burks et. al. (1930) reported that 83% of the boys and 86% of the girls in Terman's high school sample aimed for professional occupations. The 1947 follow-up of these subjects found that 45% of the sample had actually entered professional occupations, and 26% had entered semi-professional and higher business occupations (Terman and Oden, 1947). Of the gifted students studied by Beals and Simmons (1963), 80% planned to enter professional or managerial occupations. The percentage of subjects who actually entered such occupations was not reported. Both studies, however, agree that the vocational aspirations of gifted individuals are unusually high.

EVALUATION OF RESEARCH ON GIFTEDNESS

Although few conclusions were reached in the preceding review of the literature, such serious deficiencies plague research on giftedness that even those few conclusions must be questioned. For this

reason, this section is devoted to critical comments which apply to a large number of research projects, and to a detailed critical analysis of the major large-scale study in the field.

The most obvious deficiency of the research on giftedness is the absence of any objective and universally accepted definition of the term "gifted." The discussion of the concept of giftedness in Chapter I indicated some of the widely varying definitions employed: giftedness is assessed through such divergent indicators as contribution to society, creativity, scholastic achievement, and intelligence. As a consequence, it is often impossible to compare findings based on one "gifted" sample with those based on another. In 1963 Newland commented on this problem in an article entitled "A Critique of Research on the Gifted":

There is an urgent need for a synthesized and integrated summary of research in this area which could provide information on giftedness. But many "studies" cannot be interrelated meaningfully because of the incomparability of the measures obtained in them, and the absence of much significant social and educational information about the groups studied (p. 391).

Nevertheless, these problems are not insurmountable. It is possible, although difficult, to select

studies which employ roughly comparable populations and measures. A more serious difficulty, paradoxical in view of the large number of publications, is the incompleteness of the literature. Vast numbers of articles, theses, and books have been written, yet few researchers have studied the academic, emotional, and social correlates of intellectual giftedness. In quantity alone research concerning this aspect of giftedness is sadly deficient. A search through the Exceptional Children journals from 1954 to 1971 unearthed fewer than thirty articles on the intellectually gifted, none of which reported any new research on the academic, emotional, or social characteristics of these individuals. Earbe's highly rated Psychology and Education of the Gifted (1965), a collection of the "best" from four decades of writing on the topic, includes no reports of significant research other than Terman's early work. Almost invariably, publications on giftedness are theoretical or philosophical treatises of the concept itself, collections of "hints" for the raising and teaching of gifted children, comparisons of gifted students in one educational program with those in another, or laments concerning the inadequacy of research on the topic.

In 1959 Abraham complained:

Many of our discussions about gifted children are still where they were three to five years ago. We continue to define, identify, list characteristics, argue about enrichment versus acceleration versus special classes, quote the Terman study and compile the names of people and places contributing to the field (p. 316).

This comment leads logically to a third and related deficiency of literature on giftedness: its dependence on the early work of Terman and his associates. Terman, or one of his associates (Burks, Jensen, Miles, Oden), was acknowledged as a contributor to findings in almost every area discussed, and sometimes the Terman studies provided the only research data on which to base a given conclusion. Several writers have discussed the importance of the Terman studies. In 1954 a symposium chaired by Ruth Strang concluded that:

. . . the things that could be said with certainty in 1954 about the gifted child did not differ substantially from Terman's earliest findings . . . by and large, further conceptual development and fundamental knowledge seems not to have been forthcoming (from Getzels and Jackson, 1962, p. 2).

In 1958 Tannenbaum said of Terman's 1925 study: "the findings reported in this and the follow-up studies form the core of scientific knowledge about intellectually gifted children (p. 28)." In 1970

Rice wrote: "the classical results of Terman have clearly indicated that intelligence as expressed through the I.Q. is closely related to future academic and professional performance (p. 40)."

Attention must be focused, therefore, on Terman's set of studies which began in the early 1920's. This gigantic project, involving approximately 1500 subjects and spanning a period of forty years, was the first major piece of research to challenge the then-prevailing concept of the highly intelligent as physically puny, emotionally unstable, unpopular, and unsociable. Instead Terman concluded that highly intelligent children (i.e. those scoring above 140) excelled on almost every variable tested. The gifted children, who were soon nicknamed "Termites," were superior physical specimens: taller, heavier, healthier, and more attractive. Their personal and social qualities were outstanding. They were rated as more popular (with teachers and classmates), less nervous, more emotionally stable, and more capable as leaders. Even the moral development of these children was considered superior: they were described as more trustworthy, more responsible, less prejudiced, less boastful, and more co-operative. Later studies by Terman and his associates demonstrated that the

childhood superiority of the gifted subjects was maintained in adolescent and in adult life. Significant numbers of the Termites made notable contributions to medicine, science, and the arts. Scholastic achievement, personality characteristics, and moral values remained highly commendable.

These findings must be considered in the light of Terman's research methodology. Attention will be focussed on the selection methods Terman and his associates used to identify the 643 individuals who comprised the "Regular" sample group--so named because "the selection methods used in this part of the survey were so systematic and uniform (Terman and Oden, 1947, p. 6)." Subjects in the Regular group were selected through a three step process: teachers were asked to nominate the most intelligent children from their classes; these children, plus the youngest child in each class, were given a group intelligence test; those who obtained a certain minimum score were re-tested with the Stanford-Binet. Those with scores above 140 (and a few with scores between 130 and 140) composed the Regular or main experimental group.

The deficiencies in the selection of gifted subjects are made obvious by the number identified alone. According to the normal curve distribution

those above I.Q. 140 should comprise 1.1% of the population. Terman, however, managed to locate only 649, or 0.4% of the 158,812 children he surveyed (Hughes and Converse, 1962). At one time Terman stated that his survey probably missed from 10% to 25% of the gifted in the classes he considered, although at another point he claimed a 10% or lower failure rate in identification. Hughes and Converse estimate those missed to be close to 66%. There is good reason to assume that this large unidentified segment differed significantly from those who were included in Terman's famous sample.

In the first place, teachers are notoriously poor in identifying highly intelligent students: their success rate at this task averages 50% (Terman and Oden, 1947; Pegnato and Birch, 1959). Teachers tend to choose high achievers rather than those of high intellectual ability. Moreover, the group intelligence test administered (a highly-speeded test regarded today as rather inadequate) would further penalise students who were poorly motivated, those with reading difficulties, and those who were exceptionally anxious (Hughes and Converse, 1962).

Inconsistent application of these selection procedures compounded the error. For the sake of

efficiency, grades one and two were canvassed only in the "best" schools: if grades three to eight had yielded no gifted children, grades one and two were omitted in that school. The number of students tested varied from 2% in the poorest schools to 20% in the best (Terman, 1925). Not all children nominated were given the same group test, and some were given no group intelligence test at all. The cut-off point on the Stanford-Binet for inclusion in the sample varied: twenty-two of those included scored below the supposed cut-off of 140 (Hughes and Converse, 1962). Finally, the sample was based largely on students from urban public schools in California; no private schools and few non-urban schools were canvassed.

Moreover, the selection procedures just discussed were the "systematic and uniform" ones used to identify the "Regular" subjects. Another 900 subjects, who were combined with the Regulars for the later follow-up studies, were selected by methods considered by Terman and his associates as less accurate. Approximately 350 of these subjects were tested by means of individual Stanford-Binets, but another 350 were included on the basis of a group intelligence test alone (Burks et. al., 1930). These 700 subjects were located through a rather interesting combination

of techniques: as siblings of previous subjects, through nominations by "volunteer assistants" or school principals, or through identification in two "co-operative surveys" of California schools (Burks et. al., 1930; Terman and Oden, 1947).^{*} Finally, a total of 195 of the subjects identified through these procedures did not co-operate in the study. The only conclusion that can be drawn is that Terman's sample was far from random, and probably quite biased.

Having obtained this biased sample, Terman proceeded in such a manner as to introduce further bias in his results. Teachers were notified of the "geniuses" in their classes, and only then were ratings on these children's achievement, social relationships, and emotional adjustments requested. Parents were notified of their children's exceptional abilities, and then their reports on a large number of factors were requested. To insure a continued high rate of co-operation on the part of the parents involved, Terman and his associates offered the services of the research bureau as a child guidance clinic. In addition, he offered to supply data from the research files for college application or for

^{*}These surveys are not described, and no references are given.

job reference purposes. In an article lauding Terman and his subjects, Miles (1960) unwittingly emphasized these methodological shortcomings:

It has been said that Professor Terman did not himself realise what a great part he played in the life development of his gifted group, especially of those in academic fields. He wrote letters of introduction, letters in support of applications, advised them, let them freely consult him, and in every possible way aided and abetted their progress (p. 53).

Although the co-operation rate among Termites was very high in the original and in the follow-up studies, response rates for particular items of data were sometimes inexplicably low. For example, data concerning high school achievement are reported for only 77 subjects (Burks et. al., 1930, p. 100).

Even if the methodological deficiencies of the Terman research are disregarded, the age of the project (begun in the early 1920's) and its California setting make the validity of results for an Edmonton population highly suspect. It is clear that the conclusions of Terman's project, the major work on giftedness, must be questioned. However, other lesser projects must be considered as well.

As previously stated, the methods and findings of other studies cannot be discussed in similar detail

to the Terman studies. For the most part, the findings of the large number of early studies and the very few recent ones have been consistent with Terman's conclusions. However, most of these studies have been consistent with the Terman work in shortcomings as well as in conclusions.

Random sampling techniques were very rarely employed in the studies of gifted individuals. The majority of studies selected subjects through procedures which would tend to eliminate underachievers and the poorly adjusted. Often these studies have dealt with subjects in special classes or in special schools. Since admission to special classes or schools is usually dependent on superior achievement and adjustment as well as on intelligence, a sample chosen in this manner cannot be considered representative. Similarly it is invalid to compare gifted children from one school with average children from another: differences in achievement or adjustment may be a result of variations in school climate.

A grave deficiency of many studies is associated with measures used to assess personality and social adjustment. The frequently used teacher ratings are subjective and are especially susceptible to the influence of the halo effect: knowledge of intellectual superiority leads to assumptions of superiority

in other areas. On the other hand, empirical measures of personality (and especially the very transparent personality inventories which are often used with children) may be, in large part, measures of intelligence: the highly intelligent child may readily perceive and supply the "right" answer rather than what is true for him.* Smith (1962) is critical of what he refers to disparagingly as "tests of moral or ethical knowledge." He argues that in these tests high scores are as much a result of intellectual knowledge as of high moral standards.

A further problem with much of the research is its limited scope and sample size. Most projects since Terman's have been small, typically involving fewer than fifty subjects (e.g. Barrett, 1957; Shechtman, 1960; Sheldon, 1963), usually from a single school district or even from a single school. Moreover, few researchers have dealt with a wide range of variables.

Finally, virtually every gifted sample studied to this date has differed significantly from the norm in socio-economic status and in religious or ethnic background. Since numerous studies have found positive

*Appendix B illustrates this point with selected items from the Woodworth-Cady Questionnaire.

correlations between socio-economic status and adjustment (e.g. Coster, 1959; Liddle, 1958), and between socio-economic status and achievement (e.g. Porter, 1965; Bowman, 1960); it is questionable whether the alleged superiority of the gifted in adjustment and achievement is the result of intelligence factors or of socio-economic factors. Failure to take into account socio-economic status and cultural group is a weakness common to almost every study of giftedness.

Frierson (1965) designed a study to answer the question of whether Terman's findings describe the personality characteristics of gifted children or of high socio-economic status children. He carefully selected four elementary school groups: upper status gifted, upper status average, lower status gifted, and lower status average. In addition, he carefully matched all four sub-samples for age, sex, ethnic background, grade, and school experience. Results indicated no significant differences in total scores on the Children's Personality Inventory among any of the four groups. However, significant differences existed between upper and lower status children, regardless of ability level, on several of the test sub-scales. Frierson's results emphasize the impor-

tance of considering socio-economic status in describing the personality characteristics of gifted children. So far as this study is concerned, however, Frierson's results have two limitations: first, the gifted children were selected from special classes; and second, the subjects were considerably younger than those with which this study is concerned.

Another recent study carefully controlled for all of the variables known to be important. In his 1962 study, Smith controlled for religion, socio-economic status, and "nationality backgrounds." He selected his subjects, normals and gifted, from regular classes in the same public schools; and employed an extensive battery of sophisticated personality measures. His results revealed very few significant differences in personal adjustment in the two groups studied. Smith emphasized the influence of social class, nationality, and religious differences in the adjustment of individuals. He concluded that "interpersonal conflicts and problems in interpersonal relationships are equally as pressing for the gifted as for the adolescent of average intelligence (p. 56)."

Although Smith used careful controls and an impressive battery of personality assessment techniques

his results are open to question because of one serious defect. All of his subjects were in regular classes in public schools in Syracuse, New York. Since Syracuse has special classes for gifted students within the public school system, and since the selection of students for these classes is on the basis of intellectual, emotional, social, and physical superiority (Gill, pers. comm., 1970), Smith's gifted sample might have been as biased as any of those he criticized, but in the opposite direction. If students in special classes are a select group, superior in emotional and social adjustment as well as in intelligence (as Smith himself argued), then those remaining in regular classes must be below the norm for gifted students in adjustment. As in the case of Terman's findings, Smith's results cannot be accepted as valid, because of the biased sampling technique employed.

One final study will be considered in this section. It was conducted by Bonsall and Steffre in 1965 with the purpose of examining the superior personality characteristics of high school boys to determine whether they are a function of "giftedness" or of socio-economic background. The subjects were 1,359 gifted and average boys, all white, from several

senior high schools.

"Gifted" referred to the top 11% of these students according to norms for the Primary Mental Abilities Test. The Guilford-Zimmerman Temperament Survey was used as the measure of personality. The researchers discovered significant personality differences associated with intelligence in several areas, and significant personality differences associated with socio-economic background in several other areas. Their conclusion was that the superiority of gifted individuals is due more to their superior socio-economic backgrounds than to their superior intelligence.

The deficiencies in the methodology of most research have made the traditional conclusions regarding giftedness of questionable validity. The doubt is reinforced by a small number of well-conducted studies whose findings have contradicted the traditional views of Terman, Hollingworth, Barbe, and others. Thus, the characteristics of the gifted outlined in the first part of this chapter must be regarded with skepticism. Very little reliable empirical knowledge concerning giftedness exists at the present time.

SUMMARY

Current literature indicates that gifted individuals differ in several respects from the norm. Sex differences in the incidence of giftedness are suggested: girls are slightly less likely to be included in the gifted category than are boys. Religious and ethnic differences are not known for Canadian gifted samples, but United States research has discovered an over-representation of Jewish, German, and Anglo-Saxon groups, and an under-representation of Negro, "Latin", and American Indian groups. Higher socio-economic ratings for gifted individuals have been found in all studies investigating this topic. Gifted individuals are considered by most researchers to demonstrate more adequate personal and social adjustment. Many writers have mentioned high rates of participation in school and community activities and superior leadership capacities as typical of gifted children and adults.

However, the major source of all this data concerning giftedness--and the only source in some cases--is an early research project by Lewis Terman and associates. This project has been evaluated as seriously deficient in many aspects of research design. Other relevant research is limited in quantity and

scope, and often suffers from the same defects as the Terman work as well. Clearly, as Hughes and Converse (1963) argued, there exists a strong "case for a sequel to Terman's study."

It is now possible to explain the rationale of the present study. It attempts to survey a group of gifted subjects in the city of Edmonton in a random manner so that generalization to Edmonton's gifted population is possible. The aim of this study is two-fold: first, to compare a gifted group with average population groups; and second, to compare gifted individuals in Edmonton with the gifted individuals in Terman's sample.

The variables selected for study were simply those which previous research has suggested may be important. Because previous studies have arrived at few dependable conclusions, the present study is actually an exploratory study; consequently, no theoretical framework exists to guide research. Nevertheless, studies such as this one occupy an important place in research. This point of view is supported by Glass and Stanley (1970), the authors of a recent statistical text, who have stated that: "Without a great store of [descriptive] information, one is hardly ready to design controlled experiments. We

can get answers to important questions by the use of questionnaires, interviews, and case studies (p. 498)."

CHAPTER III

METHODOLOGY

Definition of "Gifted"

For the purposes of this study, the term "gifted" is used to refer to those students whose scores on the Co-operative School and College Ability Test (SCAT) lie in the top 10% of the Alberta distribution. Estimation of the relationship of such scores to national population values is an extremely difficult task; however, a combination of sources of information suggests that the top ten percent of the Alberta grade twelve distribution would be comparable to the top two to five percent of the general North American population. Comparable I.Q. values would begin at 130 to 135 on the popular American developed group tests. For an explanation of the method used in arriving at these figures, see Appendix A.

Explanation of Other Terms

A number of terms are used somewhat differently in this study than they are used in other studies. Whenever possible the most common usage is employed.

Religious affiliation. The religious denomination with which a subject's family claimed affiliation was used to classify the subject's religious affiliation. Concern was with the religion of the family rather than of the subject himself because it was felt that the former would have a greater influence upon the subject's development.

Ethnic origin. In this study ethnic origin refers to the cultural or national group to which a subject's ancestors on the male side belonged on coming to this continent. This definition corresponds to the one used in the collection of Canadian census data, and therefore has the advantage of ready comparability with existing population norms.

Socio-economic status. This term is applied to the status of an individual's occupation as assessed by its numerical rating on the "Socio-Economic Index for Occupations in Canada" developed by Bernard Blishen

(Blishen et. al., 1968). Ratings on this scale are based on two factors thought important in determining an individual's social standing: the average years of education his occupation requires, and the average income it commands.

Blishen's index has been employed for two variables in this study: father's occupation and subject's aspired occupation. The former is self-explanatory; the second refers to the rating given to the occupation named by the subject in response to the question: "What is your vocational aim?" In addition, for some statistical analyses a grouped measure of socio-economic status is necessary; therefore the term "socio-economic class" is used to refer to a subject's father's classification in the six occupational levels into which Blishen has divided his index. Further discussion of the Blishen index follows in the section entitled "Research Instruments."

Achievement. The term "achievement" refers to educational or scholastic achievement only. The four major achievement measures used in this study are:

1. Level of education completed: the number of years of formal schooling successfully completed. Years of schooling include all complete years of

post-secondary education, whether at university, technical school, or a training hospital, as well as the usual elementary and high school years.

2. Grade twelve marks: subjects' percentage marks on their first attempts at Department of Education standardized examinations in social studies, mathematics, chemistry, physics, biology, English, and a second language. An over-all grade twelve mean for subjects is computed by summing all first attempt marks, and dividing by the total number of marks.

3. First year university grades: all grades received by subjects during first year at the University of Alberta, regardless of the year in which the grades were received. Most of the grades were based on 1967-68 results, although a small number are based on 1968-69 or 1969-70 results.

4. 1970 university grades: all grades received by subjects during the 1969-70 academic year at the University of Alberta. These grades represent subjects' most recent achievement scores. While the majority of subjects for whom 1970 grades were obtained were third year students, a few (i.e. 10) were first year students, and a larger number were second year students.

Research Instruments

Three research instruments were used in the collection of data for this study: a test of scholastic ability or intelligence (the SCAT); an index of socio-economic status (the Socio-Economic Index for Occupations in Canada); and a measure of personality variables (the California Psychological Inventory).

Co-operative School and College Ability Test (SCAT). This scholastic aptitude test, published by Educational Testing Service, is administered annually by the Department of Education to all Alberta students enrolled in grade twelve (i.e. all students who registered for one or more grade twelve departmental examinations during that school year). SCAT scores used in the definition of the sample were obtained from the Series I, Level II version of the test administered to all grade twelve students in the spring of 1967.

The SCAT, although labelled a "scholastic ability test," is actually a group intelligence test which does not really differ from other intelligence tests in skills and abilities measured (Anastasi, 1968). Like the vast majority of intelligence tests, it provides three scores: a verbal, a quantitative, and a total score. The total score is calculated from

the verbal and quantitative scores, with the verbal score weighted more heavily than the quantitative in the calculation.

Evaluation of the SCAT has been quite favourable. Russell (in Buros, 1965) described the SCAT as a good measure of general intelligence, reported high correlations between SCAT totals and WAIS totals, and concluded that the "SCAT series then, can be confidently regarded as a set of very good scholastic aptitude tests which probably is in most ways the equal of any of its competitors (p. 453)."

The primary reason for the choice of the SCAT as the measure of intelligence was the availability of scores for all students. However, the favourable assessment of the SCAT by reviewers gives added support to its use in this study.

The Blishen Socio-Economic Index for Occupations in Canada. The version of the Blishen index employed in this study is the revised index published in 1968, and based on 1961 Canadian census data. It consists of a rank ordering of 320 occupations, each of which has been assigned a numerical status value based on the average years of education it requires, and the average income it commands. Thus, "trappers and hunters" has been assigned the lowest rating on the

index (25.4), and "chemical engineers" the highest (76.7).

The Blishen scale has been divided into six groups as indicated in Table 1.

Table 1

CLASSES IN THE BLISHEN SOCIO-ECONOMIC INDEX

Class	Socio-Economic Index	Number of Occupations	Percentage of Alberta Labour Force
I.	70.00 or above	24	5
II.	60.00 - 69.99	26	4
III.	50.00 - 59.99	36	10
IV.	40.00 - 49.99	52	20
V.	30.00 - 39.99	103	29
VI.	below 30.00	79	33
Totals		320	101*

* Blishen's total. (adapted from Canadian Society, 1968, p. 752)

The Blishen socio-economic index was chosen for use in this study for several reasons. Foremost among them was the fact that it is based on Canadian census data and designed specifically for use with Canadian populations. However, other factors recommend its use as well. Since assigning a Blishen

rating to an individual requires knowledge of his occupation only, the Blishen method of determining socio-economic status avoids both the possible offensive personal questions and the combining of measures required for most other methods. Moreover, this index has been widely used in Canadian research, and has been shown to have high validity. Blishen (1968) reports that his scale correlates .91 with Tuckman's prestige ranking of Canadian occupations, and .92 with Pineo-Porter status ratings of Canadian occupations.

California Psychological Inventory (CPI).

This "test" is a measure of personality designed for use with socially-functioning individuals. According to Gough, author of the test, the CPI scales "are addressed principally to personality characteristics important for social living and social interaction (1969, p. 5)."

The inventory contains 480 statements to which the respondent answers "True" or "False." Scoring of these responses yields scores for eighteen scales, each designed to measure an important dimension of personal adjustment. The eighteen scales are grouped (logically, not statistically) into four categories

of related variables, dealing with measures of interpersonal adequacy, value structures, intellectual functioning, and interest modes. A complete list of these scales and a few explanatory notes can be found in Appendix C.

Means and standard deviations vary from one scale to another, although high scores on any scales are normally interpreted as indicating good adjustment. However, determining the over-all adjustment of an individual is not simply a matter of averaging his scores on the eighteen variables. Interactions among scales, and scores on certain individual scales must be considered as well.

Studies by the test author (1969) have found test-retest reliabilities for the eighteen scales to range from .44 to .77 with a median of .67 among high school students over a period of one year, and from .49 to .87 with a median of .80 among male prisoners over a period of one to three weeks. Extensive evidence of scale validities is also reported in the test manual.

The California Psychological Inventory was chosen for use in this investigation because of the wide range of personality factors included in the test, and because of its extensive use, particularly

with college populations and high ability groups. In addition, the CPI has received favourable evaluations by authorities in the field of psychological testing. Kelly (in Buros, 1965) concluded: "All in all, however, the CPI in this reviewer's opinion is one of the best, if not the best, available instruments of its kind (pp. 71-2)." Anastasi (1968) concluded: "On the whole, however, the CPI is one of the best personality inventories currently available. Its technical development is of a high order and it has been subjected to extensive research and continuous improvement (p. 448).

The chief limitation of the CPI was thought to be the American bias of the test. Several questions refer specifically to American experience and are irrelevant to Canadian subjects (e.g. "I think Lincoln was greater than Washington.") Moreover, Canadian norms, if they exist, proved impossible to locate. However, as no widely used and well-standardized Canadian personality test exists, the CPI was chosen as the best of several not entirely satisfactory alternatives. In order to dispel (or confirm) any doubts as to the validity of the CPI with a high ability Canadian sample, several independent (non-test) personality-related measures were included

among the data collected with the intention of correlating the non-test values with values for the appropriate CPI scales. The outcome of this small-scale validity check is considered in the discussion of results.

Hypotheses

Due to the uncertain nature of current knowledge concerning the gifted, formulating specific directional hypotheses is meaningless. Therefore, in this study, the following null hypotheses are the actual research hypotheses:

Ho1: There are no significant differences between gifted and average populations in 1) the proportions of males and females; 2) enrolment in public, separate, and private schools; 3) religious affiliation; 4) ethnic origin; 5) socio-economic status; and 6) schooling of parents.

Ho2: There are no significant differences between gifted and average populations in 1) grade twelve marks; 2) first year university grades; and 3) 1970 university grades.

Ho3: There are no significant differences between the mean scores of gifted individuals on the eighteen CPI scales and the mean scores for university

students in general.

Population and Samples

Population. The population from which subjects were selected consisted of all grade twelve students in Edmonton schools who completed the SCAT during the spring of 1967 and whose scores on this test were above the ninetieth percentile in the Alberta provincial distribution. Members of this finite population (N=636) comprised a preliminary group for which a limited amount of information was recorded. The term "gifted population" as used throughout this study refers to this group of 636 individuals.

Sample. From the population of 636 persons, 200 were selected randomly for more intensive study. "Gifted sample" is the term used to designate this group.

CPI sample. Administering the CPI to the entire sample was considered a prohibitively large task; therefore a second random sample, consisting of 53 persons, was selected from the first sample of two hundred individuals. "CPI sample" is the term used to designate this random sample of 53 persons.

Collection of Data

Data for this study were obtained from a variety of sources: the records of the Alberta Department of Education, responses to a telephone interview, responses to a specially designed questionnaire, University of Alberta records, and California Psychological Inventories. Each of these sources of information is discussed individually in the following section.

Department of Education records. The Department of Education computer print-out for the 1967 SCAT results provided some of the necessary data: SCAT total scores for all grade twelve students, percentile standing of each SCAT score, and school attended by each student. This information was recorded for the 636 students from Edmonton schools whose scores were above the ninetieth percentile.

Additional data were collected from individual ledger cards at the Department of Education for the two hundred subjects in the gifted sample. The following information was transcribed from these cards for each of the 197 subjects for whom record cards existed: sex, birthdate, most recent home address, and marks in final examinations in grade twelve.

Telephone interview responses. A brief explanatory letter (see Appendix D) was mailed to each of the "regular" subjects (i.e. those in the gifted sample) whose current addresses could be determined. This was followed within one to two weeks by a telephone call to the residence of each subject. The writer developed a set of standardized questions (see Appendix D) which were used in all interviews. These questions were answered by the subject if he could be reached, or by a parent if the subject were not then living in Canada. Data on family characteristics and other personal or background information were obtained: parent's occupations, schooling, ethnic origins, and religious affiliations; subject's present occupation and vocational aim, post-secondary education undertaken, and plans for further education. Additional information was recorded for those who were enrolled at that time in some post-secondary educational institution: institution attended, program of studies, year in program, and time allotted to classes and studies. For the majority of subjects (i.e. all who personally answered the questions), some information related to personality dimensions was collected as well: club memberships and offices, time devoted to certain leisure activities (i.e. reading, watching television, sports), and participation in selected

social activities (e.g. attending movies, theatre performances, or sports events).

Questionnaire responses. A questionnaire (see Appendix D) was designed to collect the same information as the telephone interview and was used for those subjects not residing in Edmonton at the time of the survey. The questionnaires, accompanied by letters explaining the nature of the study and stamped envelopes addressed to the investigator, were mailed to subjects for whom out-of-town addresses could be traced.

University data. University of Alberta files were checked to identify those subjects who had attended university in Edmonton. Photostatic copies of transcripts were made for all 144 subjects who had registered at the University of Alberta prior to January of 1971. Data obtained from the university transcripts included grades for all courses completed by September, 1970; grade point averages for each full year of study; degrees conferred; scholastic honours awarded; withdrawals from university (when these occurred during any academic year); and status at time of withdrawal (e.g. voluntary withdrawal or required to withdraw).

California Psychological Inventory. Subjects selected for the CPI sample were contacted by telephone or letter and asked to complete a personality inventory. As in the case of the telephone interview, anonymity was assured; and in addition, an explanation of each subject's personal results was offered. Brief directions were given at this time, and any questions with regard to the inventory were answered. The inventories were administered through a mail-out mail-back procedure, with a stamped envelope addressed to the investigator enclosed with each inventory.

Analysis of Data

The analysis of data consisted largely of categorizing and totalling responses, calculating sample statistics, and comparing sample statistics with corresponding population statistics. The population groups which served as control groups, changed according to the variable under consideration. For example, the comparison group for religion and ethnic origin consisted of all Edmonton residents in the same age group; while the comparison group for grade twelve marks consisted of all 1967 grade twelve students.

Background information. Most of the background data collected required little or no alteration

before reporting; all that was necessary was to tabulate frequencies or to calculate means for each variable (e.g. ethnic origin, socio-economic status); and to compare frequencies or means within the gifted sample with frequencies or means in the general population. Some comparisons were also made between males and females within the gifted sample. In all cases, the significance of frequency differences was tested by means of the chi-square statistic, and the significance of differences between means was tested by the z-statistic.

Educational achievement. As previously explained, four major measures of subjects' educational achievement were employed: level of education completed, grade twelve marks, first year university grades, and 1970 university grades. Means for these measures were calculated for gifted subjects, and compared with appropriate student norms in the two cases where this was possible (i.e. first year and 1970 university averages). Z-tests were performed to determine the significance of differences between means. Distributions of marks in grade twelve and in both university years were compared with distributions of marks for total student populations. The chi-

square statistic was used to determine the significance of differences between distributions. In the case of means and distributions for university populations, it was necessary to calculate weighted population values. The reasons for using weighted population values and the methods used to calculate them are discussed in Appendix E.

Personality factors. California Psychological Inventory answer sheets were hand-scored to obtain each subject's scores for the eighteen personality dimensions. Answer sheets with many unanswered items were discarded, and profiles were plotted for each of the remaining 38 subjects. The means for each scale were calculated separately for males and females, and composite profiles based on these scores were plotted to provide pictures of "typical" profiles for gifted males and females. Comparisons were made between the raw score means for gifted subjects and the college norms presented in the CPI manual. The significance of differences between sample and population means was tested with the z-statistic.

Limitations of this Study

The chief limitation of this study is the advanced grade level at which gifted students were identified. Those gifted students who are poorest in achievement and adjustment might tend to drop out of school at earlier grade levels. Therefore, the sample of gifted individuals selected for this study is probably superior in achievement and adjustment to a random sample of all gifted individuals in the same age group.

It was recognized in designing this study that this limitation would operate; however, the alternative also involved certain limitations. If selection of subjects were made on the basis of intelligence tests administered at a lower grade, a larger proportion of all gifted individuals might be identified, but a larger proportion of subjects would be untraceable. This would reduce the level of confidence which could be placed in the results. Moreover, the numbers of gifted students who have dropped out of school prior to grade twelve is thought to be very small, since drop out rates are very low during school years for students at the top ability levels.

Other limitations concern the research instruments employed. The measure of intelligence, the

SCAT, is a group intelligence test. Gifted subjects in Terman's study (or at least the majority of them) were identified by means of individual intelligence tests. As evaluated by Thorndike and Hagen (1969), group intelligence tests penalise to a greater degree students who are poorly-motivated, highly anxious, or deficient in reading skills (pp. 317-319). However, Thorndike and Hagen add that the limitations of group tests are most apparent with young children. The bias can be expected to be relatively minor with high school students.

The third limitation has already been mentioned: the CPI, which has no Canadian norms. Because of doubts as to its adequacy, certain traits measured by the CPI scales were also assessed through non-test data. This made it possible to check the validity of the scales concerned, and hence to make inferences about the validity of other scales.

The effects of possible deficiencies in the CPI cannot be predicted. The net result of the first two limiting factors is likely to be a slight inflation of "true" values for Edmonton's gifted in achievement and personality scores. The positive bias in results is estimated to be very small in comparison with the Terman results, because this

study has avoided the more serious limitation of non-random sampling.

CHAPTER IV

RESULTS

Results are grouped for presentation into three major sections: "Personal or Background Information," "Educational Data," and "Personality Factors." Because hypotheses were formulated only for those variables of particular interest, for many items of data no hypothesis-related conclusions can be stated. In these cases, data are of secondary interest, and are included merely to present a more complete picture of Edmonton's gifted. In all cases where statistical tests are performed, the probability value required for significance is .05.

A brief discussion of response rates is necessary at this point to provide a basis for evaluation of results. The response rates vary according to the item of data being considered; however, it is possible to calculate general response rates for each of the major categories of data--the personal information, the educational data, and the personality measures.

Background data were collected by means of

telephone interviews and questionnaires. The co-operation rate among subjects contacted by telephone was close to 100%: all but one of the subjects reached provided the information requested. The return rate for questionnaires was much lower.* Nevertheless, through the combination of telephone interviews and questionnaires, background data were collected for almost all items for 181 of the 200 gifted subjects. This corresponds to a response rate for background data of slightly over 90%.

The percentage of subjects for whom educational data were available is even higher. Department of Education information (i.e. grade twelve marks and birthdates) was collected for 197 of the 200 subjects, or 98.5%. Data concerning university achievement were also collected for almost all subjects because the vast majority of those with advanced education received it at the University of Alberta.

In the case of the personality data, the response rate was less satisfactory. Of the 53 subjects selected for the CPI sample, 38 returned completed inventories, corresponding to a response rate of 71.7%. However, the majority of the non-respondents

*The response rate was 66.7%.

were subjects who could not be contacted (because they were outside Alberta). This is an important consideration since those who refuse to co-operate in studies have been found to be less well educated, and are probably different in other characteristics as well (Travers, 1969). On the other hand, there is no reason to believe that subjects residing outside Alberta or travelling outside Canada differ in any significant way from those who were in Edmonton at the time of the survey.

Since Travers (1969) states that response rates as high as 40% are rare in the direct-mail questionnaire methods so common in educational research, a high degree of confidence in the data reported in this chapter is justified.

PERSONAL OR BACKGROUND INFORMATION

Included in this section are all data pertaining to personal information items such as sex, age, and marital status. For some of the items no normative data were available; in these cases frequencies and percentages can only be reported for the gifted sample. For other items, Edmonton or Alberta norms were located, making possible comparisons between sample and population values, and tests of significance of

differences. All data refer to subjects' responses during February or March of 1971.

Sex

Information on sex was available for 626 of the 636 individuals in the gifted population. Since normative data were not available for the entire grade twelve population in Edmonton, the distribution of males and females in grade twelve in the Edmonton Public School System was used. Table 2 illustrates the findings with regard to sex.

Table 2

SEX DISTRIBUTION OF GRADE TWELVE STUDENTS

Sex	In Gifted Population		In Edmonton Schools		χ^2
	No.	%	No.	%	
Male	368	58.8	2583	55.7	1.09
Female	258	41.2	2057	44.3	1.37
Totals	626	100.0	4640	100.0	2.46

$$\chi^2 = 2.46; \text{ d.f.} = 1; \text{ p} = \text{n.s.}$$

The chi-square value of 2.46 does not reach the .05 level required for significance. Therefore, the null hypothesis with regard to sex must be accepted: the proportions of males and females among gifted

grade twelve students are the same as the proportions of males and females among grade twelve students in general.

Enrolment in Public, Separate, and Private Schools

It was hypothesized that the enrolment of gifted students in the public, separate, and private schools in Edmonton is proportional to the enrolment of all grade twelve students in the three types of schools.

Of the total of 636 gifted students, 82.9% were enrolled in public schools, 14.0% in separate schools, and 2.0% in private schools. Information was not available for seven students, or 1.1% of the total. Population values were available only for enrolment in public and separate schools. Therefore, comparisons between sample and population values could be made only for public and separate schools. These comparisons are presented in Table 3.

Table 3

ENROLMENT OF GRADE TWELVE STUDENTS BY SCHOOL SYSTEM

School System	Gifted Population		Edmonton Population	χ^2
	No.	%	%	
Public	513	84.5	77.8	3.56
Separate	94	15.5	22.0	12.45
Totals	607	100.0	100.0	16.01

$$\chi^2=16.01; \text{ d.f.}=1; p=.001$$

The chi-square value of 16.01 is significant at beyond the .001 level. Therefore, the null hypothesis with regard to enrolment by school system is rejected. The percentage of gifted students who attended public schools is higher than expected and the percentage who attended separate schools is lower than expected.

Age

Birthdates were recorded for 181 subjects. The mean age of these subjects as of February 27, 1971, was 21.2 years. The modal age of the group was 21 years. The mean ages for males and females were very similar: 21.3 for males, and 21.1 for females. Table 4 reports the distribution of ages for males, females, and the total group.

Table 4

AGE OF SUBJECTS: FEBRUARY 27, 1971

Age	Males		Females		Total	
	No.	%	No.	%	No.	%
20	12	11.8	10	12.7	22	12.2
21	60	58.8	58	73.4	118	65.1
22	23	22.5	9	11.4	32	17.7
23 or Above	7	6.9	2	2.5	9	5.0
Totals	102	100.0	79	100.0	181	100.0

It is meaningless to compare age with population values; however, to compare age of subjects at a specified grade level with age of all students at that grade level is quite revealing. Department of Education enrolment statistics for September 30, 1966, indicate that the modal age for Alberta grade twelve students was 17 years, and that approximately 50% of all grade twelve students were included in the interval from 17 years, 0 months, to 17 years, 11 months. The modal age of subjects at that time was also 17; moreover, in the gifted sample as in the population, approximately 50% of subjects were included in the interval from 17 years, 0 months, to 17 years, 11 months. However, the percentages younger or older than modal age are different in the gifted sample than in the Alberta population. Table 5 presents comparative data concerning age in grade twelve for the gifted sample and for the Alberta grade twelve population.

The chi-square value of 40.13 in Table 5 is significant at better than the .001 level. It is clear that the gifted students, when in grade twelve, were younger on the average than their classmates.

Table 5

AGE OF GRADE TWELVE STUDENTS: SEPTEMBER 30, 1966

Age of Students	Gifted Sample		Alberta Population	χ^2
	No.	%	%	
Below Modal Age	66	36.5	20.1	24.09
At Modal Age	90	49.7	49.7	.00
Above Modal Age	25	13.8	30.2	16.04
Totals	181	100.0	100.0	40.13

$$\chi^2 = 40.13; \text{ d.f.} = 2; p = .001$$

Marital Status

Data regarding marital status were obtained for 181 subjects. 76.2% of the subjects reported their marital status as "single," 22.1% as "married," and 1.7% reported "other" in response to the question on marital status. The reported married proportion is higher than the university proportion (15%), but the mean age for these students is slightly higher than the mean age for undergraduates in general. Among male subjects, 16.7% were married; among female subjects, 29.1%. The only comparable population values that could be obtained refer to the Edmonton 20 to 24 age group; in this group, 35.4% of males and 64.6%

of females were married. Although not strictly comparable, these figures indicate similar male-to-female ratios in the sample and population group.

Religious Affiliation

It was hypothesized that the distribution of subjects by religious affiliation corresponds to the distribution by religious affiliation of all Edmonton residents in the same age group.

Responses were recorded for 181 subjects to the item on religious affiliation. Normative data were obtained from 1961 Canadian census data on religion of ten to fourteen year olds in Edmonton (the age group into which subjects would fall in 1961). Sample and population frequencies are reported in Table 6.

The chi-square value for religious affiliation in Table 6 is significant at the .02 level. The null hypothesis is rejected: the distribution of subjects by religious affiliation does not correspond to the distribution by religious affiliation of all Edmonton residents in the same age group. Over one-half of the value of the chi-square (i.e. 10.43 of the total of 17.33) was contributed by the category "Other." Because of the varying religious groups included in this category, no firm conclusions can be drawn regarding over-representation or under-representation of individual religious groups.

Table 6
RELIGIOUS AFFILIATION

Religion	Gifted Sample		Edmonton Population	χ^2
	No.	%	%	
United Church	65	35.9	34.1	.17
Greek or Roman Catholic	40	22.1	24.6	.46
Anglican	23	12.7	14.2	.28
Lutheran	13	7.2	6.4	.12
Presbyterian	7	3.9	3.8	.01
Orthodox	4	2.2	4.4	1.98
Pentacostal & Baptist	3	1.7	4.9	3.88
Other	26	14.3	7.7	10.43
Totals	181	100.0	100.1	17.33

$$\chi^2 = 17.33; \text{ d.f.} = 7; p = .02$$

Ethnic Origin

It was hypothesized that the distribution of subjects by ethnic group corresponds to the distribution by ethnic origin of all Edmonton residents in the same age group.

Ethnic origins were tabulated for 181 subjects. Normative data were obtained from the 1961 Canadian

census data on ethnic origin of Edmonton residents in the 10 to 14 age group. Sample and population frequencies are reported in Table 7.

Table 7
ETHNIC ORIGIN

Ethnic Group	Gifted Sample		Edmonton Population	χ^2
	No.	%	%	
Anglo-Saxon	116	64.0	52.1	4.99
German	20	11.1	9.2	.67
Ukranian	10	5.5	10.0	3.62
Other European	10	5.5	6.1	.09
Polish	7	3.9	3.9	.00
French	4	2.2	6.2	4.65
Dutch	3	1.7	3.7	2.04
Scandinavian	3	1.7	5.1	4.21
Other	8	4.4	3.7	.28
Totals	181	100.0	100.0	20.55

$$\chi^2=20.55; \text{ d.f.}=8; \text{ p}=.01$$

The chi-square value of 20.55 is significant at the .01 level. Therefore, the null hypothesis is rejected: the distribution of subjects by ethnic origin does not correspond to the distribution by

ethnic origin of all Edmonton residents in the same age group. Over-represented among gifted subjects are those of Anglo-Saxon descent, and under-represented are those of French, Scandinavian, Ukrainian, and Dutch descent.

Socio-economic status

Data concerning socio-economic status were collected for 181 subjects in the gifted sample. The mean Blishen rating for fathers of gifted subjects is 52.2, compared with a mean of 39.2 for the Alberta labour force. The difference between sample and population means is significant at better than the .001 level. Therefore it is concluded that the socio-economic status of gifted individuals is significantly higher than the provincial average. Of course, it must be recognized that the mean age of subjects' fathers is considerably higher than the mean age of the Alberta labour force in general, so that the socio-economic rating of the former would be expected to be somewhat higher than average. However, the difference between sample and population values is so large that it is unlikely that age differences account for it totally.

It was hypothesized that the distribution of gifted subjects by socio-economic group corresponds

to the distribution of all Alberta residents by socio-economic group. The percentages of subjects and of the total Alberta labour force in each of the six Blishen categories are reported in Table 8.

Table 8
SOCIO-ECONOMIC STATUS

Class	Gifted Sample No.	%	Alberta Labour Force %	χ^2
I.	31	17.1	5	53.24
II.	31	17.1	4	77.96
III.	32	17.7	10	10.68
IV.	42	23.2	20	.93
V.	32	17.7	29	8.00
VI.	13	7.2	33	36.56
Totals	181	100.0	101*	187.37

$\chi^2=187.37$; d.f.=5; $p=.0001$ *Blishen's total

The chi-square value of 187.37 is significant at far beyond the .001 level (a chi-square value of only 20.52 is required for significance with five degrees of freedom). Therefore, the null hypothesis with respect to socio-economic class is rejected: the gifted sample differs from the norm in distribution by socio-economic class. The percentages of

subjects at the upper socio-economic levels (i.e. the three highest classes) are higher than expected; and the percentages at the lower socio-economic levels (i.e. the two lowest classes) are lower than expected.

Fathers' Education

Responses with regard to fathers' education were tabulated for 180 subjects. Canadian census data for 1961 (Dominion Bureau of Statistics, 1963) provided roughly comparable population data, although classification in the government publication is on the basis of the last grade attended rather than the last grade successfully completed. Sample and population values are reported in Table 9. Normative values are based on the education of Edmonton males in the 25 to 44 age bracket (the age group into which virtually all of the subjects' fathers would fall in 1961). Chi-square values are not calculated because of the classification differences in sample and population statistics.

Data presented in Table 9 indicate that the level of education completed by fathers of subjects is far higher than the level of education completed by all Edmonton males in the same age group. Fewer fathers than expected are in all categories below

the university level, and far more are in the university groups.

Table 9
FATHERS' EDUCATION

Educational Level	Fathers of Gifted Subjects		Edmonton Males
	No.	%	Ages 25 to 44 %
No Schooling	0	0	2.4
Grade 8 or Less	34	18.9	24.6
Grades 9 or 10	28	15.6	24.4
Grade 11	18	10.0	12.8
Grade 12	32	17.8	22.1
Some University	20	11.1	5.0
University Degree	48	26.7	8.7
a) Bachelor Degree (28)		(15.6)	"
b) Advanced Degree (20)		(11.1)	"
Totals	180	100.0	100.0

Mothers' Education

Data on mothers' schooling were obtained for 180 subjects. The 1961 Canadian census provided roughly comparable data: the last grade attended by Edmonton females in the 25 to 44 age group. Chi-square values are not calculated because of

differences between the sample and the population in data classification methods.

Table 10
MOTHERS' EDUCATION

Educational Level	Fathers of Gifted Subjects		Edmonton Females
	No.	%	Ages 25 - 44 %
No Schooling	0	0	1.8
Grade 8 or Less	28	15.6	21.0
Grades 9 or 10	32	17.8	24.8
Grade 11	17	9.4	16.1
Grade 12	55	30.6	27.9
Some University	31	17.2	4.7
University Degree	17	9.4	3.7
a) Bachelor Degree	(16)	(8.8)	-
b) Advanced Degree	(1)	(0.6)	-
Totals	180	100.0	100.0

Findings indicate that the level of schooling completed by mothers of subjects is far higher than the level of education of all females in the appropriate age group. Fewer mothers of gifted subjects have completed less than grade twelve, and many more have completed grade twelve or university. The mean for mother's years of schooling is 11.3 years.

Occupations of Subjects

Data on current occupations were obtained for 179 subjects. The largest response categories are "Student" which included 56.6% of all subjects, and "Employed Full-time" which included 31.1%. Numbers and percentages of subjects in all categories are reported in Table 11.

Table 11

CURRENT OCCUPATIONS OF SUBJECTS

Occupation	Number	Percentage
Student	102	56.6
Employed Full-Time	56	31.1
Unemployed	8	4.4
Homemaker	7	3.9
Travelling	7	3.9
Totals	179	99.9

Normative data were not available for most of the categories in Table 11. A federal government publication reported that among 21 year olds in Canada during the mid-sixties, 13.0% of males and 5.8% of females were students; among 22 year olds, 9.3% of males and 3.3% of females were students (Dominion

Bureau of Statistics, 1966). It appears that a much larger percentage of gifted individuals than of the general population were enrolled in educational institutions at the ages of 21 or 22.

Part-time Employment

In addition to the 56 subjects who were working full-time, 46 were working part-time. Thirty-six of these subjects were students. In other words, 35.3% of the students in the sample were employed part-time. Most of the positions held by students were connected with university departmental duties (assistantships, marking jobs, etc.), although a wide variety of occupations were included among the part-time jobs.

Vocational Aims

All subjects were asked to indicate their "long-term occupational goals", and responses of some sort were received from 170 individuals. The most common response was "I don't know," the reply of 22.4% of subjects. The eight most common responses and the numbers and percentages reporting each are shown in Table 12.

Table 12
POPULAR OCCUPATIONAL GOALS OF SUBJECTS

Goal	Number	Percentage
Unknown	38	22.4
Teacher	20	11.8
Professor	10	5.9
Physician	8	4.7
Engineer	8	4.7
None	6	3.5
Lawyer	5	2.9
Geologist	5	2.9
Other	70	41.2
Totals	170.	100.0

The occupational goals of subjects were considered as indicators of aspired status, and were assigned ratings on the Blishen scale in the same manner as for actual occupations. Thus, Blishen values were assigned to the 117 occupational goals which were included in the Blishen index. The mean socio-economic rating obtained in this way for all subjects was 66.4 (for male subjects, 68.4; for female subjects, 64.2). The distribution of subjects'

occupational goals according to the six Blishen classes is shown in Table 13. Population values (i.e. Alberta male labour force) are shown as well for purposes of comparison. It must be remembered that the population frequencies refer to actual status ratings for men already working, while the sample frequencies refer to aspired status ratings only.

Table 13

ASPIRED SOCIO-ECONOMIC STATUS OF GIFTED SUBJECTS

Socio-Economic Class	Gifted Sample		Alberta Population
	No.	%	%
I.	69	38.1	5
II.	20	11.0	4
III.	16	8.8	10
IV.	11	6.1	20
V.	1	0.6	29
VI.	0	0	33
No Classification Possible	64	35.4	
Totals	181	100.0	101*

*Blishen's total

The vocational aspirations of subjects were exceptionally high: 38.1% of the subjects aimed for professional occupations; only 6.7% had aspirations receiving ratings falling in the lower three classes.

Residence

Place of residence was classified for 181 subjects according to the categories presented in Table 14. The most common response to the question on residence was "Parents' Home" (45.3% of the sample).

Table 14

RESIDENCE OF SUBJECTS

Residence	Number	Percentage
Parents' Home	82	45.3
Apartment	60	33.2
Travelling	7	3.9
Own Home	6	3.3
Other	26	14.4
Totals	181	100.1

Club Membership

Responses to the item concerning club memberships were tabulated for 181 subjects. A total of

78 subjects (43.1%) were members of at least one club, organization, or athletic team. The largest number of memberships was in sports clubs or athletic teams. Responses for all categories are shown in Table 15.

Table 15
CLUB MEMBERSHIPS

Club	Number	Percentage
Sports	27	27.5
Entertainment	14	14.3
Student Government	11	11.2
Social	9	9.3
Religious	8	8.2
Community Service	7	7.1
Academic or Professional	6	6.1
Political	5	5.1
Other (Mainly Hobbies)	11	11.2
Totals	98	100.0

Leadership Positions

Fourteen subjects or 7.7% of the total held offices (e.g. president, secretary) in one or more

of the clubs to which they belonged. Some subjects held more than one office, so that a total of sixteen leadership positions were held by subjects. Most of the positions held were in student government.

Social Activities

169 subjects reported the number of times during the month preceding the telephone interview (or arrival of the questionnaire) that they had participated in each of several common entertainment events. A wide variation in amount of participation was noted, with values for subjects ranging from zero to thirty-six. The distribution of responses for the 169 subjects is shown in Table 16.

Table 16

ENTERTAINMENT EVENTS ATTENDED DURING A ONE-MONTH PERIOD

Number of Events	Number of Subjects	Percentage
0 - 4	34	20.1
5 - 9	68	40.2
10 - 14	36	21.3
15 - 19	16	9.5
20 - 24	10	5.9
25 or above	5	3.0
Total	169	100.0

The largest group of subjects, 40.2% of the sample, had attended five to nine entertainment events during the month prior to being contacted for this survey. The most popular entertainment event was "Visiting bars or lounges."

Study Habits

All current full-time students (N=100) reported the average amount of time they devoted to studies and assignments during a week. The mean number of hours per week was 20.6. A wide variation in number of hours of study was evident, with reported values ranging from 3.5 to 60 hours per week. The distribution of responses is shown in Table 17.

Table 17

TIME DEVOTED TO STUDIES AND ASSIGNMENTS

Hours per Week	Number of Subjects	Percentage
0 - 9	15	15
10 - 19	36	36
20 - 29	29	29
30 - 39	10	10
40 or above	10	10
Totals	100	100.0

Leisure Activities

169 subjects reported the number of hours per week they devoted to each of several common leisure activities. The most popular leisure activity was reading, to which subjects devoted an average of 6.5 hours per week. This was followed by television, then sports, with 4.9 and 2.7 hours per week respectively.

EDUCATIONAL DATA

In this section results are reported for several aspects of subjects' academic histories, including program choices, grade twelve marks, and university achievement. Whenever possible, normative population data are reported for comparison purposes, and tests of significance of differences given. Population data were obtained from the Department of Education and from the registrar's office at the University of Alberta. As in the preceding section, the level of significance required for all statistical tests is .05.

Level of Education Completed

Data on the amount of schooling completed were available for 191 of the gifted subjects, and are

reported in Table 18. The largest single group of subjects, 33.5% of the total, had completed three years of post-secondary education by January of 1971.

Table 18
SCHOOLING OF SUBJECTS

Level of Schooling Completed	Number	Percentage
Grade Eleven	11	5.8
Grade Twelve	43	22.5
One Year Post-secondary	28	14.7
Two Years Post-secondary	45	23.5
Three Years Post-secondary	64	33.5
Totals	191	100.0

No comparable population data were available concerning the amount of schooling as classified in Table 18.

Grade Twelve Achievement

It was hypothesized that the achievement of gifted students in grade twelve corresponds to the achievement of grade twelve students in general.

Grade twelve averages were calculated for a total of 189 subjects; that is, for all subjects who had received percentage grades in four or more

courses. The mean of these averages was 69.98. The mean for all grade twelve students in Alberta was not available. Table 19 presents the distribution of subjects' grade twelve marks, with comparative data for all Alberta students reported where available.

Table 19

DISTRIBUTION OF GRADE TWELVE MARKS

Marks	Percentiles	Gifted Subjects % of all marks	Alberta Grade 12 % of all marks
H	80 or above	25.5	-
A	65 - 80	47.7	-
B	50 - 65	23.8	78.7 (B or above)
C	40 - 50	2.1	16.6
Below C		0.9	4.7
Totals		100.0	100.0

The population data available for Table 19 were very limited: there was no break-down of marks at the higher achievement levels. Because of the few comparisons possible, it was considered pointless to calculate a chi-square value. However, it is obvious from inspection of the data alone that the achievement

of gifted subjects is far superior to that of grade twelve students in general.

First Year University Grades

It was hypothesized that the achievement of gifted subjects in first year university is equal to the achievement of first year students in general.

Stanine grades were available for the 125 subjects who completed first year university at the University of Alberta. Table 20 reports the distribution of numeric first year grades awarded to the subjects, and the weighted distribution for first year students in general.

The chi-square value of 55.50 in Table 20 is significant at beyond the .001 level. It can be concluded that the distribution of subjects' first year university grades does not correspond to the distribution of grades for first year students in general. The greatest differences were found in the higher percentages of 8's, 2's, and 1's, and the lower percentage of 5's obtained by gifted students.

Sample and population means for first year grades were calculated in order to show the direction of over-all achievement differences. The mean of stanine

Table 20
DISTRIBUTION OF GRADES FOR FIRST YEAR STUDENTS
AT THE UNIVERSITY OF ALBERTA

Grade	Gifted Sample		All Students		χ^2
	No. of Grades	%		%	
9	29	3.6		3.0	.95
8	115	14.2		9.2	22.44
7	161	20.0		19.2	.07
6	188	23.3		25.2	1.15
5	128	15.9		20.6	8.79
4	87	10.8		12.9	2.78
3	35	4.3		5.2	1.14
2	43	5.3		3.2	11.48
1	21	2.2		1.5	6.54
Totals	807	100.0		100.0	55.50

$$\chi^2 = 55.50; \text{ d.f.} = 8; p = .001$$

grades for subjects in first year at the University of Alberta is 5.75; the weighted mean for the first year student population, 5.64. A z-test of the difference between means indicated that it is significant at the .04 level. It can be concluded that the mean of first year grades for gifted students is higher than that of first year university students in general. However, it should be noted that the numeric difference in means (5.75 to 5.64) is very small.

1970 University Grades

It was hypothesized that the achievement of gifted students at the University of Alberta in 1970 is equivalent to the achievement of all students at the University of Alberta in 1970.

Stanine grades were available for the one hundred subjects who attended the University of Alberta for the complete academic year of 1969-1970. Table 21 reports the distribution of grades for gifted students and the weighted distribution of grades for 1970 students in general.

The chi-square value of 43.83 is significant at beyond the .001 level. It can be concluded that the distribution of subjects' 1970 university grades does not correspond to the distribution of 1970 grades

for university students in general. Differences between sample and population values were greatest for 9's, 8's, and 5's, with the gifted sample displaying an excess of 9's and 8's, and a deficiency of 5's.

Table 21

DISTRIBUTION OF GRADES FOR UNIVERSITY OF ALBERTA
STUDENTS IN 1970

Grade	No. of Grades	Gifted Subjects %	All Students %	χ^2
9	52	7.7	4.6	13.92
8	123	18.2	13.6	10.55
7	186	27.5	25.1	1.51
6	156	23.1	27.0	3.90
5	74	10.9	16.6	12.99
4	49	7.2	8.1	0.59
3	19	2.8	2.8	0.00
2	12	1.8	1.6	0.20
1	5	0.7	0.6	0.12
Totals	676	100.0	100.0	43.78

$$\chi^2=43.78; \text{ d.f.}=8; p=.001$$

The mean for subjects at the University of Alberta during the 1969-1970 academic year was 6.42; the weighted mean for the 1970 university population was 6.16. A z-test of the difference between means was significant at the .001 level. It can be concluded that the achievement of gifted university students in 1970 is higher than that of 1970 university students in general. As in the case of first year university means, it should be noted that the numeric difference in means (6.42 to 6.16) is not very large.

Non-numeric Grades

The non-numeric grades recorded on marks statements are often as important as the stanine grades. For example, the notation "F" in place of a stanine grade denotes a failing mark in a course; "W" denotes withdrawal from a course; and "AB," absent from the final examination. All three notations represent failure in one sense, because credit has been withheld for the course concerned. Among the grades received by the gifted students during their first year at the University of Alberta, .38% were F's; 8.82% were W's; and 1.04% were AB's. Among all first year students at the University of Alberta, .34% were

F's, 8.86% were W's, and 1.89% were AB's. These percentages are too small for statistical tests of significance to be valuable; however, it is apparent that there is little or no difference between gifted and other students in rate of obtaining the grades "F", "W", and "AB."

Scholastic Honours

The student record cards of the University of Alberta include a report of all prizes, scholarships, and bursaries awarded to students during their university careers. During the three year period from 1967 to 1970 the gifted subjects at the University of Alberta were awarded 30 prizes, 16 scholarships, and 12 bursaries. Several of the subjects held more than one award, so that a total of 27 subjects have received at least one scholastic award so far during their university careers.

"First class standing" is a scholastic honour award to all university students with grade point averages of 7.5 or higher. Twenty-eight subjects (8 males and 20 females), or 19.9% of those who registered at the University of Alberta, earned first class standings at least once during their university careers. No normative data were available for the general student population.

Status at the Time of Withdrawal

Marks statements for students at the University of Alberta usually contain information concerning students' status at the time of withdrawal from a program or from university. Table 22 reports the numbers and the percentages of subjects who received each of the most common withdrawal notations.

Table 22

STATUS AT TIME OF WITHDRAWAL FROM UNIVERSITY

Notation	Males		Females		Total	
	No.	%	No.	%	No.	%
Required to Withdraw	14	17.5	6	9.8	20	14.3
Withdrew	11	13.5	6	9.8	17	12.1
Required to Repeat	3	3.8	1	1.7	4	2.8
Required to Withdraw from Honours	3	3.8	0	0	3	2.1

Faculty Choice

The first faculty in which subjects were enrolled was determined for 149 of the gifted subjects. Most of these students had entered the University of Alberta, although a few were enrolled in universities

outside the province. Data on faculty choice is reported in Table 23. Several faculties with small enrolments are included in the category "Other" (e.g. Pharmacy, Agriculture, Nursing); frequencies in these faculties were too small to permit the calculation of chi-square values on an individual basis.

Table 23

ENROLMENT BY FACULTY OF FIRST YEAR STUDENTS

Faculty	Gifted Students No.	%	All Students %	χ^2
Science	52	34.8	15.4	36.77
Arts	49	32.8	23.5	5.58
Education	18	12.3	17.9	2.82
Engineering	11	7.4	9.2	.34
Business Admin.	7	4.7	6.4	.68
Other	12	8.0	27.6	20.62
Totals	149	100.0	100.0	66.81

$$\chi^2 = 66.81; \text{ d.f.} = 5; p = .001$$

The chi-square value of 66.81 was significant at beyond the .001 level. The greatest discrepancy between sample and population values occurred in the enrolments in the Faculty of Science, which claimed

far more of the gifted subjects than would be expected on the basis of population enrolments. In addition, slightly more gifted subjects than would be expected enrolled in the Faculty of Arts, and far fewer in the faculties included in the heading "Other": Nursing, Household Economics, Physical Education, Medicine, and Pharmacy.

Faculty and Program Changes

Student record cards at the University of Alberta include information pertaining to changes of faculty or to changes of program within the same faculty. During the period from September, 1967, to January, 1971, 25 or 18.4% of gifted subjects at the University of Alberta transferred from one faculty to another, and the same number transferred from one program to another. No comparative data were available on the rates of faculty or program transfers among all university students.

PERSONALITY FACTORS

In this section results are reported from a single source: the California Psychological Inventories completed by 38 subjects. Findings are

reported separately for the 21 males and the 17 females in the CPI sample, because of slight differences in the norms for the two sexes. American college norms are used to provide comparison values, since no Canadian norms were available.

All results for the CPI scales are reported in the form of raw score means. Z-tests were performed to determine the significance of differences between sample and population means for each score.

Results for Male Subjects

Table 24 reports the means for the 21 male subjects and male college norms on the 18 CPI scales. A composite profile for male subjects is presented in Figure 1.

Significant differences between the means for male subjects and college norms were found on 10 of the CPI scales. On nine of these 10 scales, the mean for gifted subjects was lower than college norms; on only one scale (Flexibility) was the score for gifted subjects higher.

Results for Female Subjects

Table 25 reports the means for the 17 female subjects and female college norms on the 18 CPI scales. A composite profile for female subjects is presented in Figure 2.

Table 24

CPI SCORES: MALE SUBJECTS AND MALE COLLEGE NORMS

Scale	Mean for Subjects	College Norms	z	p
1. Dominance	27.2	28.3	-0.80	n.s.
2. Capacity for Status	18.7	20.9	-2.65	.004
3. Sociability	24.1	25.4	-1.07	n.s.
4. Social Presence	36.1	37.3	-0.95	n.s.
5. Self-acceptance	21.2	22.3	-1.33	n.s.
6. Sense of Well-Being	34.6	36.6	-1.99	.023
7. Responsibility	28.1	30.8	-2.75	.003
8. Socialization	34.4	36.8	-2.11	.017
9. Self-control	23.8	27.6	-2.32	.010
10. Tolerance	21.0	23.3	-2.19	.014
11. Good Impression	13.8	17.2	-2.51	.006
12. Communality	24.4	25.5	-2.52	.006
13. Achievement via Conformance	24.1	27.4	-3.36	.0004
14. Achievement via Independence	20.4	20.9	-1.54	n.s.
15. Intellectual Efficiency	39.0	39.8	-0.73	n.s.
16. Psychological- mindedness	11.1	11.4	-0.46	n.s.
17. Flexibility	12.7	11.1	+1.93	.027
18. Femininity	16.5	16.7	-0.25	n.s.

Figure 1

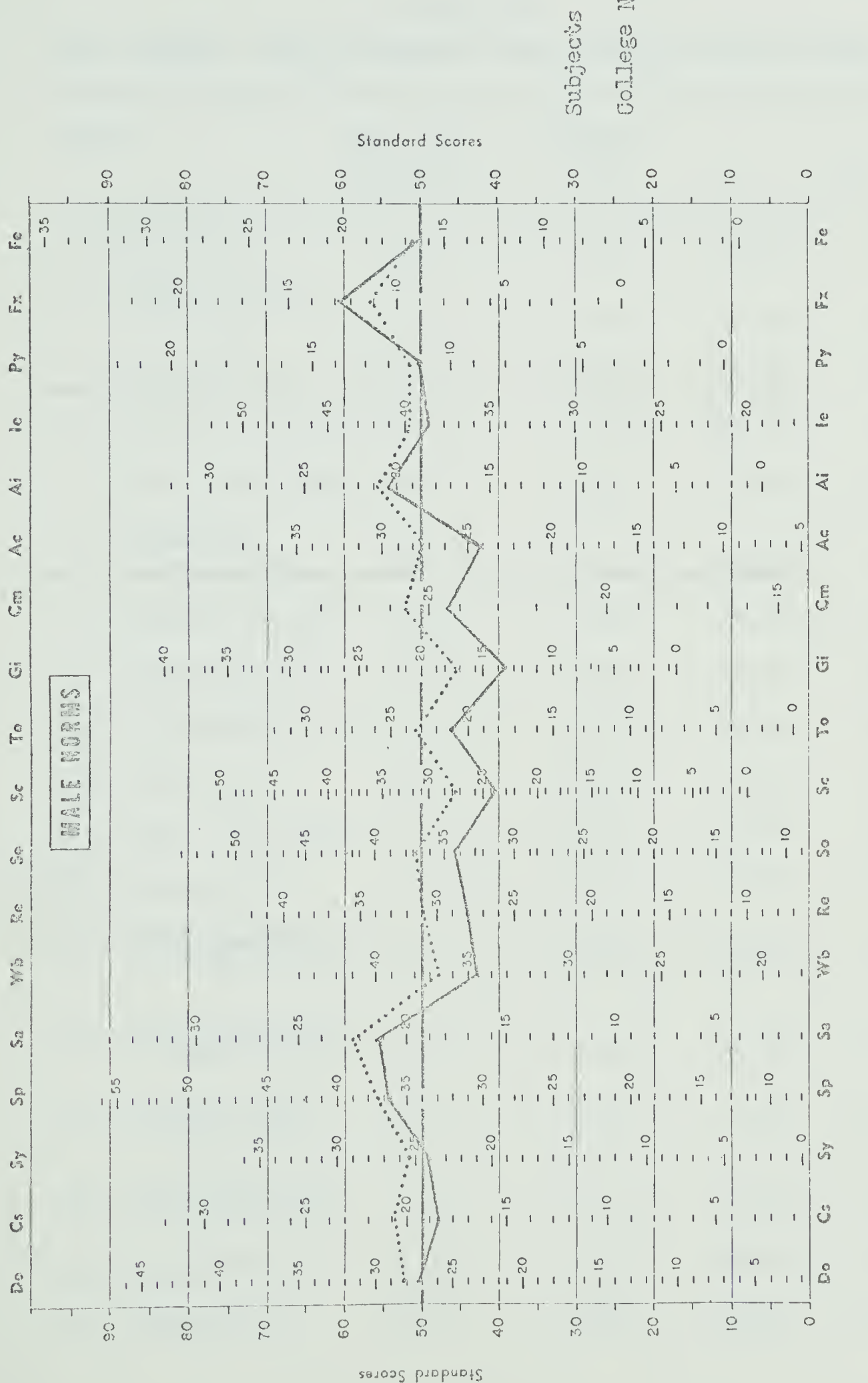
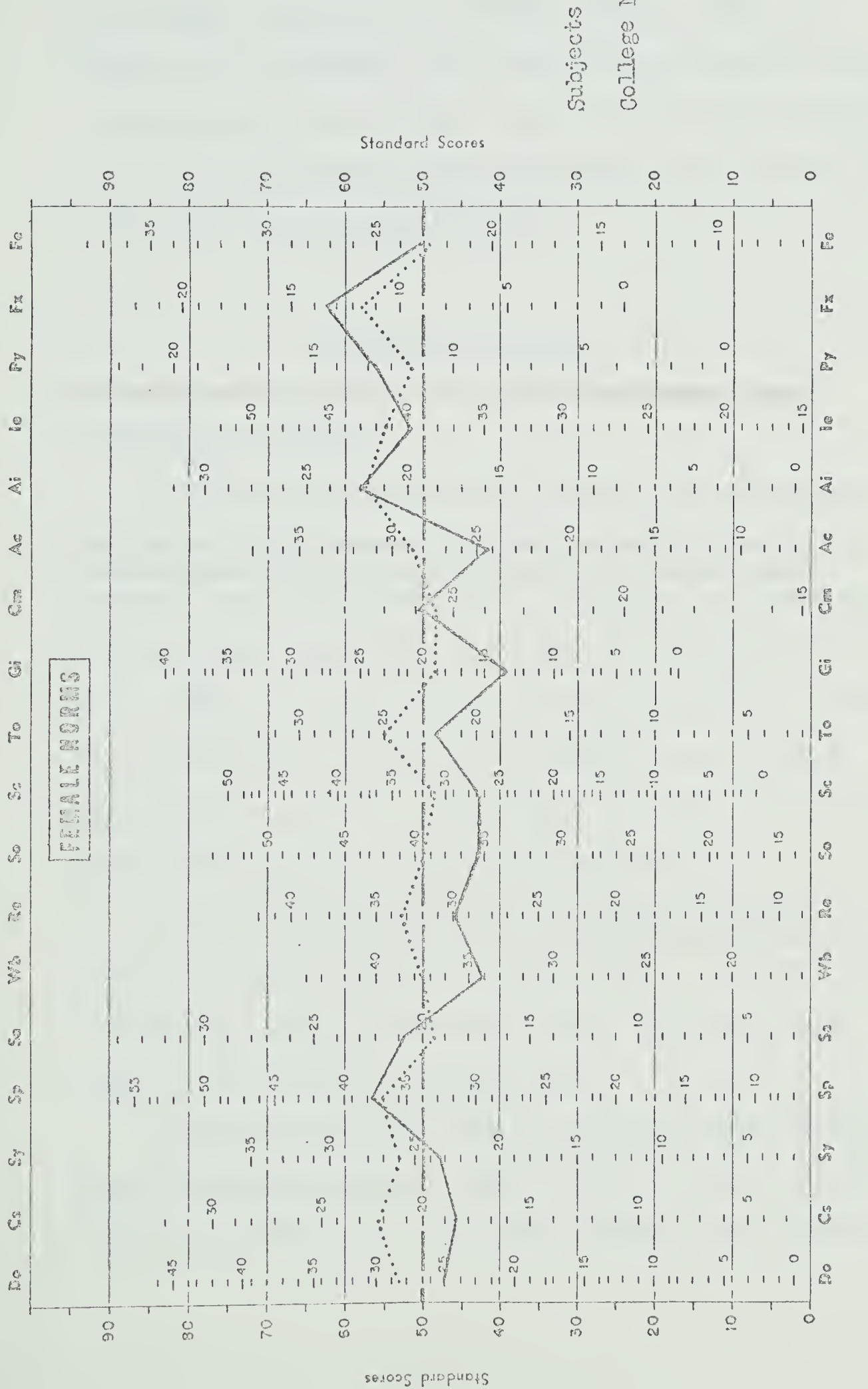


Table 25

CPI SCORES: FEMALE SUBJECTS AND FEMALE COLLEGE NORMS

Scale	Mean for Subjects	College Norms	z	p
1. Dominance	25.0	28.5	-2.45	.007
2. Capacity for Status	18.6	22.2	-4.12	.0001
3. Sociability	23.3	26.0	-2.32	.010
4. Social Presence	37.6	37.0	+0.42	n.s.
5. Self-acceptance	20.8	19.5	+0.66	n.s.
6. Sense of Well-being	34.1	37.5	-3.37	.0004
7. Responsibility	29.8	33.3	-3.50	.0002
8. Socialization	35.8	39.5	-3.13	.0008
9. Self-control	26.8	30.8	-2.23	.013
10. Tolerance	22.1	25.0	-2.84	.002
11. Good Impression	13.7	19.1	-3.59	.0002
12. Communalilty	25.8	25.5	+0.62	n.s.
13. Achievement via Conformance	24.2	28.8	-4.31	.0001
14. Achievement via Independence	22.0	21.9	+0.14	n.s.
15. Intellectual Efficiency	39.8	41.4	-1.37	n.s.
16. Psychological- mindedness	12.7	11.4	+1.85	.032
17. Flexibility	13.4	11.6	+2.00	.023
18. Femininity	23.1	22.8	+0.37	n.s.

Figure 2



Female Norms

Significant differences exist between the means for female subjects and female college norms on twelve of the scales. On ten of the 12 scales the gifted women scored lower than the normative values, and on two (Psychological-mindedness and Flexibility) the gifted women scored higher.

SUMMARY OF RESULTS

Background Factors

Significant differences between gifted individuals and the general population were found for several background variables. Results are summarized for the most important of these variables as follows:

1)Sex. No significant differences exist between the proportions of males and females among gifted individuals, and the proportions of males and females among grade twelve students in general.

2)Age. The average age of gifted subjects at the time of the survey was 21.2 years. The age of subjects in grade twelve was lower than the age of grade twelve students in general.

3)Marital status. 22% of subjects were married, and 76.2% were single. Almost twice as many of the female subjects as of the male subjects were married.

4)School system attended. The percentage of gifted individuals who attended public schools is higher than expected, and the percentage who attended separate schools is lower than expected on the basis of enrolment of all grade twelve students.

5)Religious affiliation. The distribution of subjects by religious affiliation differs significantly from the distribution by religious affiliation of all Edmonton residents in the same age group. However, no religious denomination could be identified as over-represented or under-represented, because the majority of the difference arose from the "Other" category, which included several small religious groups as well as a number of subjects reporting no family religious affiliation.

6)Ethnic origin. The distribution of gifted individuals by ethnic origin differs from the distribution of all Edmonton residents by ethnic origin. The major difference is the over-representation of Anglo-Saxons among the gifted subjects.

7)Socio-economic status. The socio-economic status of gifted individuals (based on Blishen ratings of fathers' occupations) is far higher than the average for Alberta.

8)Parents' schooling. The level of education attained by parents of the gifted subjects is far higher than corresponding population values.

Educational Data

Results are summarized for the most important of the educational variables as follows:

1)Grade twelve achievement. Grades of gifted students are far higher than those of grade twelve students in general.

2)First year university grades. The distribution of grades for gifted students does not correspond to the distribution of grades for the first year student population. Gifted students were awarded higher percentages of 8's, 2's, and 1's, and a lower percentage of 5's. The mean of gifted students' grades is also different from the mean for first year students in general. However, the numerical difference in means is very small: the mean for gifted students is 5.74; for all first year students, 5.64.

3)1970 university grades. The distribution of gifted students' 1970 grades does not correspond to the distribution of 1970 grades for university students in general. As in the case of first year university the mean of subjects' 1970 grades is higher than

that of 1970 students in general, but the difference in means is small: the mean for gifted students is 6.42; for all 1970 university students, 6.16.

4)Non-numeric grades. Gifted students in first year university at the University of Alberta received the same proportions of grades of "F", "W", and "AB" as all first year students at the University of Alberta.

5)Scholastic honours. Eight males and twenty females, or 19.9% of the gifted students earned first class standing at least once during their college years.

6)Withdrawal status. 14.3% of gifted subjects at the University of Alberta have been required to withdraw. Smaller percentages have withdrawn voluntarily, have been required to repeat, or have been required to withdraw from honours.

Personality Factors

Both male and female subjects scored significantly lower than college norms on a large number of CPI scales. Their scores were significantly higher on only two scales: Flexibility for both males and females, and Psychological-mindedness for females.

CHAPTER V

DISCUSSION

This chapter has been divided into three major parts: a discussion of some methodological difficulties encountered; a report on some relationships among variables; and finally, comparisons between the gifted individuals in this study and those in Terman's study.

METHODOLOGICAL DIFFICULTIES

The study was originally designed to explore a large number of the possible relationships among variables (e.g. the association between religion and scholastic achievement), but the extremely complex computer program involved made this impossible. Only a few of the simpler analyses were performed. The consequences of this omission must be considered.

Many researchers have demonstrated that certain background factors (such as sex, ethnic origin, and socio-economic class) substantially affect achievement and adjustment scores, even when intelligence

is held constant. A positive correlation between socio-economic status ratings and achievement scores has been reported by a large number of researchers (e.g. Gough, 1946; Coster, 1959; Linton, 1967), and it is now well accepted by educators. The relationship between socio-economic status and adjustment measures is not so widely acknowledged, but several researchers have reported positive correlations between these variables as well (e.g. Liddle, 1958; Bonsall and Steffre, 1965). It seems, then, that the traditional findings of higher achievement and adjustment scores among gifted individuals are at least partially due to the well-known higher socio-economic status of gifted subjects

Sex differences in achievement of gifted individuals as measured by grades in school and college and by incidence of university attendance have been found by many researchers. Terman and his associates (1925, 1930, 1947) found that girls received higher grades in almost all courses in school, and in the majority of courses in university. A contrast is evident when achievement is measured by incidence of college attendance. Terman and Oden (1947) reported similar rates of college attendance for males and females: 90% for male subjects, 86% for female subjects.

Dugan (1960) reported a greater male-female discrepancy in rate of college attendance among his gifted subjects: 82% for men and 70% for women. Apparently, gifted girls achieve higher grades than gifted boys, at least in elementary and high school, but are less likely to go on to university.

Sex differences in personality or adjustment have rarely been studied. However, it is quite possible that male-female personality differences exist among gifted subjects. Perhaps high intelligence is an asset for males but not for females, or vice-versa. The trait ratings studied by Terman (1925) indicated a slight superiority for girls on most measures. However, no definite conclusions as to sex differences in personality traits can be made because of the limited amount of research data available.

Ethnic or cultural background is another factor that has often been suggested as related to differences in achievement or personality. Rosen (1959, in Bowman, 1960) and Strodbeck (in Gallagher, 1964) have concluded that there are notable differences in achievement motivation, values, and philosophies of life among various ethnic groups. It is likely that these differences are reflected in differences in achievement and personality, but no research investigating this topic with gifted samples could be

located.

Religious differences in achievement and personality, like ethnic differences, have frequently been postulated but seldom studied. Stouffer (in Sexton, 1961) wrote of the "almost universal success of Jewish students," and Porter (1965) reported that in Canada the general educational level of Catholics is lower than that of the major Protestant groups; but neither cited any statistical evidence to support their statements. Similarly, discussions by Bowman (1960) and Gallagher (1964) suggest that differences in values and motivation are associated with religious differences. If such differences exist, it is likely that they would be reflected in differences in scores on personality test scales. However, none of the studies surveyed had attempted to examine this possibility with respect to gifted children.

In summary, literature on the topic reports a definite association between socio-economic class and personality, and between socio-economic class and achievement; and the likelihood of an association between sex, ethnic origin, and religion on the one hand, and achievement and personality on the other. Associations between any two of these might affect the validity of conclusions regarding the achievement and personal and social adjustment of gifted individuals.

It is clear that it is important for any study of giftedness to consider the possible influence of sex, socio-economic class, ethnic origin, and religion on achievement and personality scores. The original statistical analyses planned for the present study included several analyses of variance to study the relationships between these variables (the predictor variables) and the achievement and personality scores (the criterion variables). It was hoped to use a two-way analysis of variance program in order to include possible interaction effects of sex with each of the other three predictor variables (e.g., sex and ethnic origin). However, as mentioned before, difficulties with the appropriate computer program made these analyses impossible. Few two-way analysis of variance programs are designed to handle unequal cell frequencies (a necessary result of random sampling), and the one suitable program proved unworkable. As a result, none of the two-way analyses could be performed. However, in those cases where less complex statistical treatments had been employed, relationships among variables may still be discussed and their implications considered.

SOME RELATIONS AMONG VARIABLES

In this section findings are discussed for those relationships among variables which were analyzed by means of t-tests and Pearson's correlations (i.e. interval variables). The first portion of the discussion deals with variables related to achievement measures; the second, with variables related to personality scores (i.e. CPI scales). In both cases implications for the results of the present study are considered.

Factors Related to Achievement Measures

It was possible to study the relationships of two background variables to the achievement criteria: sex and socio-economic status. Sex differences in achievement were assessed through t-tests of differences in means for males and females; the relationships between socio-economic status and the achievement measures were assessed through Pearson's correlations.

Sex. Significant differences between means for males and females were found for first year university grades ($p=.006$) and 1970 university grades ($p=.01$) with the means for females higher in both cases by a considerable margin. The superiority of the female

subjects on these two achievement measures was not the result of a smaller and more "select" group of females entering university because very similar percentages of male and female subjects entered university (80.4% for males and 78.5% for females). Moreover, if any group became more "select" as the level of education advanced, it had to be the male group, since three years after most subjects finished high school, 54.8% of the males were still attending university as compared with 58.1% of the females. In addition, the t-tests of differences between means for level of education and grade twelve average are very close to the level required for significance: if a one-tail test had been employed, both differences would have been significant. In both cases, the mean of the female subjects was higher than that of the male subjects.

It is clear that superior scholastic achievement is characteristic of the gifted females in the present sample. However, this factor cannot bias results of this study since the proportions of males and females in the sample correspond to the proportions of males and females among all grade twelve students.

Socio-economic status. Significant correlations

between fathers' socio-economic status (i.e. Blishen rating) and subjects' achievement scores were obtained for three of the four achievement measures. The correlation between socio-economic status and subjects' years of education is small but significant: $+0.187$ ($p=.01$). The correlation between socio-economic status and grade twelve average is slightly higher: $+0.261$ ($p=.001$). Finally, the correlation between socio-economic status and first year university average is lower, but still significant: $+0.183$ ($p=.04$). No significant correlation was found between socio-economic status and 1970 university results.

Correlations between socio-economic status and achievement measures indicate that socio-economic status exerts a slight but significant effect on grades and on level of education completed. The correlation between socio-economic status and grades is highest with grade twelve achievement; it declines for first year achievement; and it disappears entirely with 1970 university achievement. The findings suggest the possibility of differential drop-out rates for the various socio-economic levels--the correlations with higher level achievement measures may be lower because of a more homogeneous sample (with respect to socio-economic status).

At any rate, socio-economic status is a factor which must be considered when conclusions regarding gifted samples are drawn. Because small positive correlations exist between socio-economic ratings and achievement scores, and because this sample is far higher than the norm, it can be expected that the achievement measures of subjects are slightly higher than they would be if influenced by high intelligence alone. The amount of inflation of scores is impossible to determine, but it is likely that a sample differentiated from the grade twelve population on the basis of high intelligence alone would exhibit slightly lower scores than the present sample. If the achievement scores of gifted subjects are adjusted downward by a small amount to compensate for the inflationary effect of socio-economic status, it would appear that grade twelve achievement would remain considerably higher than the norm, but that first year and 1970 university achievements would be equivalent to the norm.

Factors Related to Personality Measures

Two background variables, sex and socio-economic status were studied in relation to scores on the California Psychological Inventory. Sex differences

in CPI scores were assessed through t-tests of differences between means; and socio-economic differences in CPI scores were assessed through Pearson's correlations.

Sex. Significant differences between mean CPI scores for males and females were found on only two scales: Psychological-mindedness (Py) and Femininity (Fe). The latter difference, significant at the .00001 level, can be quickly dealt with, since the purpose of the Femininity scale is to assess the masculinity or femininity of interests. Higher scores for females on this scale simply indicate its validity.

The other significant difference ($p=.03$), on the Psychological-mindedness scale, requires further discussion. The mean for females on this scale was higher than that for males, but no differences exist between the male and female college norms. This difference may be a result of the particular individuals being studied, or higher Psychological-mindedness may be typical of gifted females.

At any rate, very few significant differences in personality traits appear between the males and females in this sample. It can be concluded that

there is little difference between personality profiles for gifted males and gifted females.

Socio-economic status. Significant correlations between socio-economic status and CPI scale values were found for two scales: Social Presence (Sp) and Self-control (Sc). The correlation of $-.459$ between socio-economic status and Social Presence was significant at the $.004$ level. The correlation of $+.343$ between socio-economic status and Self-control was significant at the $.04$ level. Although no specific explanation can be given for these findings, they again emphasize the necessity of considering socio-economic status in any study of giftedness.

COMPARISONS WITH THE TERMAN SUBJECTS

The decision of the writer to study gifted adolescents was originally made because of distrust of the conclusions reached by Terman and his associates. Therefore, the comparisons between subjects in the present sample and those in Terman's sample comprise an important part of this study. Many of the comparisons are affected by changes in society occurring over the past forty years; by differences between the areas where the studies were conducted (California and Edmonton); and by differences in the

selection of samples. However, many comparisons between results of the studies can still be made (e.g. incidence of males and females, age compared to the average for a grade).

Comparisons of results with regard to the incidence of giftedness among males and females indicates a fairly striking difference. In Terman's main experimental group, males outnumbered females by the significant margin of 115 to 100. In the present study, the margin was 142.5 to 100, which, although it appears large, does not differ significantly from the proportions of males and females in the grade twelve population in general. The difference in numbers of males and females in the present study probably reflects the greater tendency of males to spend two years in grade twelve.

Terman's subjects differed significantly from the norm with respect to age at a specific grade level. The report that 74% of boys and 84% of girls were accelerated by one-half grade or more (Burks et. al., 1930) indicates that a high percentage of the Terman subjects were younger than their classmates. In the present sample, 36.5% were younger than the modal age (i.e. 17 years 0 months to 17 years 11 months) for grade twelve students, compared with 20.1% of

grade twelve students in general. Burks et. al. (1930) also reported that by commonly used age-grade standards "not a single child among our 616 subjects of the Regular group then attending school was retarded (p. 67)." In the present sample, 13.8% were older than the modal age, compared with 30.2% of the grade twelve population. It appears that the Edmonton gifted students were slightly younger than their classmates, but somewhat older than Terman's subjects at the same grade level.

The Terman studies did not report religious affiliation except for a statement that the sample contained "a 100% excess of Jewish blood (1925, p.82)." The over-representation of the "Other" category in this study seems consistent with the Terman finding, although there is no method of determining with certainty whether Jewish subjects are over-represented when such small frequencies are involved (a total of four Jewish subjects in the sample).

The categories for ethnic origin employed by Terman are not generally comparable with those used in this study. Terman reported a "probable excess of Scotch ancestry; and a very great deficiency of Latin and negro ancestry (1925, p. 82)." Although no exact comparisons with Edmonton results are possible, it appears that the findings are not, at any rate,

inconsistent--the present study found a higher than expected incidence of Anglo-Saxon and lower incidence of French ancestry.

The socio-economic status of Terman's subjects was determined in a manner very similar to that employed in the present study. The occupations of the fathers of Terman's subjects were rated according to Taussig's five-level classification. The results of Terman's ratings are shown in Table 26.

Table 26

SOCIO-ECONOMIC CLASS OF TERMAN'S SUBJECTS' FATHERS

Class	Occupational Group	Percentage
I.	Professional	31.4
II.	Semi-professional and Business	50.0
	a) Higher Group	(31.2)
	b) Lower Group	(18.8)
III.	Skilled Trades	11.8
IV.	Semi-skilled to Slightly Skilled	6.6
V.	Common Labourer	0.13
Totals		99.93

(adapted from Terman, 1925, p.64)

Since class divisions in the Taussig scale and the Blishen scale are very similar, it is possible

to compare results for Edmonton with the California results. Of course, changes in the distribution by socio-economic class of the general population have occurred since 1925; specifically, increases can be expected in the percentages for the higher class levels. However, the differences between samples are in the opposite direction. Among fathers of Terman subjects, 31% were employed in professional occupations; among Edmonton subjects, 17%. Among the Terman subjects' fathers, 31% were employed in higher-level semi-professional occupations; among the Edmonton subjects' fathers, 17% were so employed. Finally, while only 6.7% of those in Terman's group were employed in semi- or unskilled labour, 13% of those in the Edmonton group were employed in these occupations. It appears that the occupational status ratings of fathers of Terman's subjects are much higher than those for fathers of the Edmonton subjects, despite the difference in time which should have produced the opposite trend.

Among the Terman subjects the mean for amount of schooling of fathers was 12 grades, or slightly lower than the comparable value for the Edmonton group (12.2 grades). However, changes in population values during the past forty years makes this

comparison of dubious value. It is more accurate to state that the schooling of fathers of subjects in both studies was far higher than average.

In Terman's sample, the mean for amount of schooling of mothers was 12 grades, somewhat higher than the value for the Edmonton group (11.3 grades). The discrepancy between sample and population values would probably be much greater for the Terman sample than for the present sample, since the educational level of the general population was lower in Terman's time. In effect then, the mothers of Terman's subjects were farther above the norm in educational level than are the mothers of the Edmonton subjects.

The amount of time devoted to certain leisure activities was recorded for Terman's subjects and for subjects in the present study. Among Terman's subjects, reading was the most popular leisure activity: males spent an average of 7.2 hours per week reading; females an average of 7.6. In the present study as well, reading was the most popular activity, with an average of 6.5 hours per week for all subjects. However, active sports were the second most popular activity for Terman's group, while television has usurped second place among the present subjects.

The educational achievement of subjects was a primary concern of both studies. However, Terman's

results focused on standardized achievement tests rather than school and college grades. In the small group for which high school grades were reported, there were four to eight times as many "A's" (the highest grade, probably comparable with Alberta's "H") as among unselected Los Angeles high school pupils. The gifted girls received "A" grades in almost three-quarters of all courses; the boys in one-half. The average of grades (on a four-point scale with a high of one) was between 1.4 and 1.8 for boys, and between 1.1 and 1.5 for girls. At that time the average for unselected Los Angeles high school students was 2.7 (Burks *et. al.*, 1930, pp. 100-108).

It was not possible to determine how much more frequently than normal the gifted Edmonton subjects received "H" grades. However, 25.5% of the marks of Edmonton subjects are in the highest category (H's) as compared with 50% to 75% of the marks of Terman's subjects. The grade twelve achievement of Edmonton subjects, therefore, is considerably higher than that of grade twelve students in general, but lower than that of Terman's subjects. In addition, there are no significant differences in the grade twelve achievement of males and females in this study, while the difference in achievement of Terman's male and

female subjects appears quite large.

Terman and Oden (1947) concluded that the college grades of subjects were superior to the norm, but "not always as high as might have been expected from a group of such marked intellectual superiority (p. 168)." The distribution of college grades of Terman's subjects is shown in Table 27.

Table 27

AVERAGE GRADES IN COLLEGE FOR THE TERMAN SUBJECTS

Average Grade	Men		Women	
	No.	%	No.	%
A	71	12.5	49	11.3
B	345	60.5	296	68.4
C	147	25.8	87	20.1
D (or lower)	7	1.2	1	0.2
Totals	570	100.0	433	100.0

(adapted from Terman and Oden, 1947,
p.155)

The results of the present study suggest a conclusion somewhat less positive than Terman's although not inconsistent with it: the achievement of Ed-
monton's gifted students is very slightly higher than that of university students in general. However,

the differences between means for gifted males and females are greater than the differences between sample and population means. The means for gifted males are actually slightly lower than the corresponding student population means, both for first year university grades (5.45 compared to 5.64) and for 1970 university grades (6.05 compared with 6.16). So far as university achievement is concerned, it seems that it is a greater advantage to be female than merely to have a high I.Q.

Terman and Oden (1947) wrote that the percentage of graduating students in the gifted sample who received honours standings was a "truer index of academic success(p. 155)" than were records of average university grades. Among his subjects, 31.3% of the men, and 29.9% of the women received honours distinctions. Moreover, these figures were lower than the true percentages, because some subjects attended colleges where no honours standings were awarded. Among subjects in the present study, twenty-eight (19.9% of all subjects who completed at least one year at the University of Alberta) earned first class standing at least once during their university careers. Only eight of these subjects were male: in other words, 9.9% of male subjects have received

honours standing at least once during their university careers. On the other hand, twenty, or 33.3% of the female subjects have received honours standing. Normative data were not available either for the Terman subjects or for the Edmonton subjects. It is not valid to compare directly the proportions of subjects who received honours from the one study to the other, because of the differing standards which may be involved in the awarding of honours standing. However, it is possible to compare the male-female differences in the percentages who received honours standing. In the Terman study, approximately equal percentages of men and women received honours standing; in the present study, more than three times as high a percentage of women as men received honours standing.

If scholastic honours are considered an important index of academic achievement, then scholastic "dishonours" should be considered important as well. Terman and Oden (1947) reported that 7.7% of the gifted men and 2% of the gifted women "flunked out" of college (p. 168). In the present sample, more than twice as many "flunked out": 17.5% of men and 9.8%

of women were required to withdraw from university (see Table 22). In addition, 3.8% of male subjects and 1.7% of female subjects were required to repeat an academic year; and a further 3.8% of males were required to withdraw from honours programs. Thus, 24.7% of males and 11.6% of females received the three very definite "dishonours" notations (i.e. Required to Withdraw, Required to Repeat, and Required to Withdraw from Honours).

Furthermore, an unknown number of the 17 subjects who voluntarily withdrew from university during an academic year actually belong in the "flunk-out" category. The technique of withdrawing from university prior to final examinations in order to avoid a required to withdraw situation is quite common at the University of Alberta--several subjects explained their withdrawals from university in this way. It is likely, then, that the actual percentage of students who made unsuccessful attempts at university is somewhat higher than the totals indicate. Apparently, if the achievement of Edmonton gifted subjects as measured through scholastic dishonours is outstanding, it is in the opposite direction to that expected--present subjects achieve distinction through the high, rather than low, percentages of failures.

Personality traits of gifted subjects were investigated both in the Terman project and in the present study. Terman and Oden (1947) summarized their findings as follows:

A battery of seven character tests showed gifted children above average on every one. As compared with unselected children they are less inclined to boast or to overstate their knowledge; they are more trustworthy when under temptation to cheat; their reading preferences, character preferences, and social attitudes are more wholesome; and they score higher in emotional stability. On total score of the character tests, the typical gifted child of nine years tests as high as the average child of twelve (Terman and Oden, 1947, p.56).

These findings were supported by teacher ratings of Terman's gifted subjects. The gifted subjects were rated higher than unselected children on twenty-four of the twenty-five traits considered. Those ratings which are relevant to the present study are reported in Table 28.

Although the nature of the personality assessment methods makes comparison of individual traits impossible, it is to be noted that in the present study, ratings on all but one of the CPI traits for males, and on all but seven of the traits for females lie below college norms. Males scored significantly below the norm on all six of the CPI's "character" traits (i.e. class II scales): Responsibility (Re), Socialization

(So), Self-control (Sc), Tolerance (To), Good Impression (Gi), and Communality (Cm). Female subjects scored significantly below the norm for five of the six CPI "character" traits (all but Communality). For a complete list of subjects' CPI scores, see Tables 24 and 25; for comments on the meaning of CPI scales, see Appendix C.

Table 28

PERCENTAGES OF TERMAN'S SUBJECTS RATED ABOVE AVERAGE
IN PERSONALITY TRAITS

Teacher-rated Trait	% of Boys Above Average	% of Girls Above Average	% of All Subjects
Will Power and Perseverance	83	86	84
Desire to Excell	81	88	84
Cheerfulness and Optimism	66	62	64
Self-confidence	81	82	81
Conscientiousness	71	74	72
Leadership	67	73	70
Sympathy and Tenderness	59	58	58
Sensitivity to Approval	58	56	57

(adapted from Terman, 1925, pp. 546-547
and from Terman and Oden, 1947, p. 52.)

The over-all picture of the "typical" Edmonton gifted student which emerges from the individual scale ratings is a rather negative one. If the CPI scores are accurate, the average gifted subject compares rather poorly with the average college student.

These very unexpected results, combined with the negative comments about the CPI made by several subjects, led the investigator to question the validity of the CPI for Alberta gifted students. Since a ready-made opportunity existed in the form of the non-test data, it was decided to check the validity of the CPI for this sample. Several of the personal and educational information items measured variables related to those measured by the CPI scales. Correlations in the expected directions would provide evidence of scale validities with this sample.

Specifically, if the CPI is a valid measure of personality for gifted subjects, positive correlations should be found between: 1) Capacity for Status and aspired status; 2) Sociability and social activities; 3) Self-control and hours of study; 4) Responsibility and hours of study; 5) Socialization and hours of study; 6) Achievement via Conformance and grade twelve

average; 7) Achievement via Independence and first year average; 8) Achievement via Independence and 1970 university average; 9) Achievement via Conformance and level of education completed; and 10) Achievement via Independence and level of education completed. Moreover, the mean for gifted subjects on the Intellectual Efficiency scale should be significantly higher than the mean for the general population.

Pearson product-moment correlations between these test and non-test data generally conformed to expectations. Nine of the ten correlations are in the expected direction, although only three were significant at or above the .05 level. Moreover, the mean for subjects on the Intellectual Efficiency scale is higher than the population mean, although not significantly so. Although these results do not provide strong and unequivocal support for the validity of the CPI scales, there is no basis for concluding that scales are invalid.

Moreover, there is no reason to regard the American college norms as invalid for an Edmonton college population. Other recent research (e.g. Checkley, 1971) has found relatively normal profiles for University of Alberta undergraduates.

The previously described findings with respect to the personality profiles of gifted subjects in this study must be regarded as valid. It can be concluded that gifted subjects in Edmonton rate less favourably than normative college populations, and much less favourably than the gifted subjects in Terman's sample.

CONCLUDING COMMENTS

Analysis of all the comparisons made indicates that both Terman's and the present subjects demonstrate superiority on those factors related to accidents of birth: they enjoy higher than average socio-economic status; they possess parents with better than average schooling; and they more frequently belong to the favoured Anglo-Saxon group. In those areas where superiority results largely from one's own efforts (i.e. school and college achievement), Terman's subjects were outstandingly successful, while the performance of Edmonton subjects is not much better than average. Moreover, like Terman's subjects, the Edmonton group had the advantage of high socio-economic status. Finally, the personal qualities of Terman's subjects were highly

commendable, while those of the Edmonton subjects were slightly less favourable than average.

Of course, in considering these conflicting results, it is important to remember certain differences in the samples. Most of Terman's subjects had I.Q.'s above 140; in other words they were in the top 1% to 2% of the population. Subjects in the present sample were within the top 10% of the Alberta grade twelve population, and probably within the top 2% to 5% of the general population. The fact that the Terman subjects were higher in intellectual ability undoubtedly accounts for some of the differences between the samples.

Another portion of the difference may stem from changes in social conditions and values. This would not affect comparisons between the relative superiority of Terman's subjects to their contemporaries and of Edmonton subjects to theirs. Presumably, changes in society will have affected the less intelligent as well as the more intelligent of its members. Thus, if high scholastic achievement is no longer an aim of today's youth, then this fact should be reflected in lowered student population means as well as lowered gifted population means. The relative difference between the two can be ex-

pected to remain approximately the same. Similarly, if the values of responsibility, self-control, and so on, have become less important to today's youth, this situation should be reflected in lowered population values as well. However, since the CPI college norms are approximately ten years old, it is impossible to determine the extent to which social changes have influenced the personality results.

It appears unlikely that differences in the exceptionality of the samples, or changes in social conditions could have accounted for all of the differences between Terman's sample and the present one. It is probable that the defects in Terman's methodology resulted in an abnormally superior sample, and contributed to the uniformly superior achievement and personality traits of his subjects. Whatever the reasons may be, it is evident that a high score on an intelligence test is not the "gift" it has been traditionally thought to be.

CHAPTER VI

CONCLUSIONS

This study was designed to compare gifted college-age youth with their contemporaries on factors related to background characteristics (such as religious affiliation and socio-economic status), scholastic achievement, and personality traits. Two hundred subjects were selected randomly from all 1967 Edmonton grade twelve students whose scores on the Co-operative School and College Ability Test were in the top decile of the Alberta distribution.

Data concerning background characteristics were collected through telephone interviews with subjects in Edmonton, and through questionnaires mailed to subjects outside Edmonton. Through these methods, background information was obtained for 181 subjects, or 90% of the sample. Educational data, including grades in final year of high school and in two years of university, were obtained from the Alberta Department

of Education and the University of Alberta. These data were available for over 95% of the subjects who had completed the level of education concerned. Personality data were obtained from California Psychological Inventories. These were administered through a mail-out mail-back procedure to a portion of the gifted sample; that is, to a smaller sample randomly selected from the two hundred gifted individuals. Useable inventories were received from 71.9% of the CPI sample (N=53).

The significance of frequency differences between sample and population values was tested by means of the chi-square statistic; differences between sample and population means were tested by the z-statistic. A small number of differences between male and female subjects were tested by means of t-tests.

It was found that the gifted sample differed from comparable population groups on certain variables within all three categories. Among the background variables investigated were sex, religious affiliation, ethnic group, socio-economic status, and parents' schooling. No significant differences between sample and population values existed for sex, but significant differences were found for all of the remaining variables mentioned. Although subjects differed from

the norm in religious affiliation, it was not possible to determine which groups were over-represented because of the small frequencies involved. For ethnic origin, the major difference arose from the over-representation of those of Anglo-Saxon descent. For both socio-economic status and parents' schooling, values for the sample were far above the Alberta norms. These findings are quite consistent with Terman's findings of higher than average socio-economic status and parental educational levels, and over-representation of those of Scottish ancestry.

The major items of educational data collected were grade twelve average, first year university average, and 1970 university average. Significant differences were found on all three of these items: the achievement of gifted students was higher than average in every case. However, in the case of the two university measures, the superiority of the gifted students was very small (less than .3 stanine points). Furthermore, in university, gifted students earned the "dishonour" of being required to withdraw or to repeat a year at the approximately the same rate as they earned the honour of first class standing. The educational data for the present study presents a striking contrast to the traditional findings of

highly superior achievement among gifted students, both in school and in college.

With respect to educational achievement, separate mention must be made of sex differences. All means for female subjects were considerably higher than corresponding population values; while means for male subjects were slightly lower on two achievement measures: first year and 1970 university grades. In addition, more than twice as high a proportion of the gifted women earned first class standing, and fewer than one-half as many were required to withdraw from university or to repeat an academic year.

Significant differences in personality factors were found on a large number of CPI scales. In contradiction to Terman's findings, almost all of the differences indicated poorer adjustment on the part of the gifted subjects. However, because the comparison was with American rather than Canadian norms, this finding should be interpreted with caution.

It can be concluded that the advantages associated with giftedness are directly related to family characteristics: socio-economic status, education of parents, and possibly ethnic origin. So far as university achievement is concerned, the gifted group as a whole

is slightly above average, largely due to the high achievement of female subjects. In the case of personality factors, gifted individuals actually appear to be somewhat less well-adjusted than average college students. The findings of this study raise considerable doubts as to the validity of traditional conclusions with respect to giftedness.

In any area of scientific concern, the first research conducted should consist of a series of exploratory studies designed to identify and describe; to determine the "what" of a situation. As Glass and Stanley (1970) explain, a solid base of survey research is necessary before controlled experimentation may be initiated. Only then may adequate studies of causality be conducted in order to determine the "why" of a situation. Finally, it becomes possible to determine how to alter the situation if it is considered undesirable, or how to encourage it if it is judged desirable. This is the final, practical goal of most research--but cannot be a concern of initial studies in a field. The problem must be identified before it can be treated.

In the area of intellectual giftedness, the development of research is still at the descriptive

or exploratory stage: the quantity of empirical data available concerning gifted persons is extremely limited. The first need, therefore, is for a number of studies whose sole purpose is to describe the gifted individual with accuracy. Results of the present study indicate that traditional conclusions with regard to gifted individuals are not uniformly valid. It is important to determine whether this phenomenon is restricted to the group studied or whether it has wide-spread applicability. If the latter is found to be true, then the entire concept of "giftedness" requires re-evaluation.

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Appendix A

Estimated I.Q.'s of the Present Sample

ESTIMATED I.Q.'s OF THE PRESENT SAMPLE

It can be assumed that the mean Stanford-Binet I.Q. of North Americans is 100.0. It is well-known that the mean I.Q. for a high socio-economic area is considerably above the population mean (e.g. Gallagher, 1964). Alberta, as a relatively high socio-economic area (the province has one of the highest per capita incomes in Canada), will have a provincial mean I.Q. slightly higher than the North American population mean, probably between 105 and 110. This view is supported by studies which report the mean I.Q. of Edmonton school children as above 110.

Furthermore, the mean I.Q. of school pupils is known to rise with grade level--in fact, Terman estimated that high school subjects represented the top ten to twenty per cent of the population in ability. Changes in the rates of high school attendance make Terman's estimate of the intelligence level of high school students unreasonably high for today's students. However, it is not unreasonable to estimate that grade twelve students are in the top 50% of the population in intellectual ability (approximately 50% of grade two students reach grade twelve, and grade two students themselves are somewhat above the popul-

ation in average I.Q.)).

The present sample consists of the top 10% of grade twelve students; or, in other words, probably the top 5% of Alberta residents. However, Alberta is above the norm in socio-economic status, and therefore in mean I.Q. as well. As a result, I.Q. scores for the top 10% of Alberta's grade twelve students would lie somewhere within the top 5% of I.Q. scores for North Americans--the top 2% to 5% seems a reasonable estimate.

Appendix B

The Woodworth-Cady Questionnaire

THE WOODWORTH-CADY QUESTIONNAIRE

The Woodworth-Cady Questionnaire was used by Terman to reveal abnormal emotional tendencies among the gifted subjects he studied. He estimated that dissimulation would not affect results in this test seriously.

The following test directions and test items were selected from the discussion of the Woodworth-Cady Questionnaire in Volume I of Genetic Studies of Genius (Terman, 1925, pp. 501-505).

Directions:

"Look at the directions here, (pointing). It says: 'Answer every question as truthfully and honestly as you can by drawing a line under the right answer, as shown in the samples.' "

"First sample: 'Are there seven days in a week?' The right answer is yes, so the word yes has a line under it."

"Second sample: 'Do you sleep 15 hours a day?' All of you draw a line under yes or no to tell whether you sleep 15 hours a day."

(Pause.)

"Below are other questions. Answer every one truthfully and honestly by drawing a line under yes or no. Do not skip any. Go."

Allow all, or practically all, to finish. Exceptionally slow pupils may be urged to go faster.

Selected test items:

2. Are you afraid in the dark?
9. Can you usually sit still without fidgeting?
10. Do people say you are disobedient?
16. Does the thought of hurting a person or animal give you pain?

- 25. Do you sometimes cry yourself to sleep?
- 28. Do you like to tease people till they cry?
- 40. Have you ever been arrested, fined, or placed on probation?

Appendix C

Descriptions of CPI Scales

DESCRIPTIONS OF CPI SCALES

Scale

Purpose

Class I. Measures of Poise, Ascendancy, Self-Assurance and Interpersonal Adequacy.

- | | |
|------------------------|---|
| 1. Dominance | (Do) To assess factors of leadership ability, dominance, persistence, and social initiative. |
| 2. Capacity for Status | (Cs) To serve as an index of an individual's capacity for status. . . to measure the personal qualities and attributes which underlie and lead to status. |
| 3. Sociability | (Sy) To identify persons of outgoing, sociable, participative temperament. |
| 4. Social Presence | (Sp) To assess factors such as poise, spontaneity, and self-confidence in personal and social interaction. |
| 5. Self-acceptance | (Sa) To assess factors such as sense of personal worth, self-acceptance, and capacity for independent thinking and action. |
| 6. Sense of Well-being | (Wb) To identify persons who minimize their worries and complaints, and who are relatively free from self-doubt and disillusionment. |

Class II. Measures of Socialization, Maturity, Responsibility, and Intrapersonal Structuring of Values.

- | | |
|-------------------|---|
| 7. Responsibility | (Re) To identify persons of conscientious, responsible, and dependable disposition and temperament. |
|-------------------|---|

8. Socialization (So) To indicate the degree of social maturity, integrity, and rectitude which the individual has attained.
9. Self-control (Sc) To assess the degree and adequacy of self-regulation and self-control and freedom from impulsivity and self-centeredness.
10. Tolerance (To) To identify persons with permissive, accepting, and non-judgmental social beliefs and attitude.
11. Good Impression(Gi) To identify persons capable of creating a favourable impression, and who are concerned about how others react to them.
12. Communalilty (Cm) To indicate the degree to which an individual's reactions and responses correspond to the modal ("common") pattern established for the inventory.

Class III. Measures of Achievement Potential and Intellectual Efficiency.

13. Achievement via Conformance (Ac) To identify those factors of interest and motivation which facilitate achievement in any setting where conformance is a positive behavior.
14. Achievement via Independence (Ai) To identify those factors of interest and motivation which facilitate achievement in any setting where autonomy and independence are positive behavior.
15. Intellectual Efficiency (Ic) To indicate the degree of personal and intellectual efficiency which the individual has attained.

Class IV. Measures of Intellectual and Interest Modes

16. Psychological-
mindedness (Py) To measure the degree to which the individual is interested in, and responsive to, the inner needs, motives, and experiences of others.
17. Flexibility (Fx) To indicate the degree of flexibility and adaptability of a person's thinking and social behavior.
18. Femininity (Fc) To assess the masculinity or femininity of interests. (High scores indicate more feminine interests, low scores more masculine.)

Appendix D

Introductory Letters and the Questionnaire

(The questionnaire which is included in this section served as the basis for the telephone interviews as well as being used verbatim for the actual mailed questionnaire.)



January 6th, 1971.

Dear

A telephone survey of a number of former Edmonton high school students is being conducted by Betty Dusseault, a graduate student in the Faculty of Education. The survey will contribute to a Master's thesis in Educational Psychology. Your name was selected as one of the superior ability group to be studied.

The student researcher is interested in certain characteristics of this particular group of young adults, such as age, marital status, and present occupation. She will ask such questions as: "In what year did you complete your high school education?" and "Do you plan to undertake any further education?" All information received will be held in strictest confidence.

As thesis supervisor for this project, I am requesting your co-operation in answering the student researcher's questions when she telephones.

JC:lm1



Department of Educational Psychology
University of Alberta
Edmonton 7, Alberta
February 27, 1971

Dear _____

You may have learned that an attempt was made to contact you in connection with a telephone survey of a group of individuals of high academic ability. Since it has proved impossible to reach you by telephone, I am enclosing a questionnaire which requests the information usually obtained over the phone.

This questionnaire is part of a survey of former Edmonton students of superior scholastic ability. All of those involved were grade twelve students in 1967. The survey will contribute to my master's thesis in Educational Psychology. The thesis is supervised by Dr. J. Chambers, associate professor of education at the University of Alberta.

Individual replies will be held in strictest confidence; only totals and percentages will be used in the final report. General results will be made available to you if you wish.

Your co-operation in completing and returning this questionnaire will be greatly appreciated. Thank-you very much.

Yours sincerely,

Betty Dusseault
Graduate student

QUESTIONNAIRE

A. BACKGROUND INFORMATION

Please check the appropriate reply:

1. Marital status: Single _____ Married _____
Divorced _____ Separated _____ Other _____
2. Residence: In parents' home _____ Own home _____
Apartment _____ Rooming house _____ Shared house _____
Students' residence _____ Other (please specify) _____

3. Your family's religious affiliation: Roman
Catholic _____ United _____ Anglican _____ Greek or
Ukrainian Orthodox _____ Jewish _____ Other (please
specify) _____
4. The highest level of education completed by father:
Elementary school _____ Junior high _____ Some senior
high _____ High school _____ Some university or
equivalent _____ Bachelor degree _____ Master's degree
_____ Ph. D. or equivalent _____
5. The highest level of education completed by mother:
Elementary school _____ Junior high _____ (con'd)

Some senior high _____ High school _____ Some uni-
 versity or equivalent _____ Bachelor degree _____
 Master's degree _____ Ph. D. or equivalent _____

6. The approximate date you completed all high
 school courses: June, 1967 _____ August, 1967 _____
 January, 1968 _____ June, 1968 _____ Not yet comple-
 ted _____ Other (please specify) _____

Please indicate:

1. Your father's ancestral country (e.g. England,
 Germany): _____

2. Your mother's ancestral country: _____

3. Your father's occupation in 1967 (or his major
 occupation during adult life if retired or de-
 ceased in 1967--please be specific):

4. Your mother's occupation in 1967:

5. Your present occupation: _____

6. Your long-term occupational goal: _____

B. FOR THOSE CURRENTLY EMPLOYED FULL-TIME

1. How long have you been employed in your present job? _____
2. What other jobs have you held (full-time) since high school? _____
3. Do you plan to undertake any further education in the future? Yes, definitely _____
Probably _____ Undecided _____ Unlikely _____
No _____ If "Yes" or "Probably", please indicate the course of studies you plan to undertake. _____

C. FOR THOSE WHO HAVE ATTENDED ANY POST-SECONDARY
EDUCATIONAL INSTITUTION

Institution attended _____

When attended: From _____ to _____

Faculty or program _____

Length of program _____

Do you plan to undertake any further training or education in the future? _____

If "Yes", please describe _____

D. FOR THOSE WHO HAVE NOT ATTENDED ANY EDUCATIONAL
INSTITUTION SINCE HIGH SCHOOL

Please explain your decision not to undertake
further study

E. LEISURE ACTIVITIES

1. Are you a member of any club, organization or
athletic team? Yes _____ No _____

If yes, please indicate the nature of the club
or team (e.g. Ski Club)

2. Do you hold an office in any club, organization
or athletic team? Yes _____ No _____

3. On the average, how many hours a week do you
devote to each of the following activities?

Classes and labs (Present students only)

Studies and assignments (Students only)

Your regular job

Part-time employment _____ Please describe _____

House work or other home duties

Watching television

Leisure reading

3. Conf'd. . .

Sports (as a participant)

Religious services

Other activities or hobbies (please describe)

4. During the past month, how many times did you attend each of the following types of entertainment events?

Movies or theatre performances

Dances Parties

Concerts Sports (as a spectator)

Visiting bars or lounges

Others (Please describe)

If you wish to receive a summary of the results of this summary, please check here

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Appendix E

Calculation of Weighted Distributions and Weighted Means

CALCULATION OF WEIGHTED DISTRIBUTIONS AND WEIGHTED MEANS

Most subjects in the gifted sample completed first year university in 1968. However, a sizeable proportion of subjects did not complete first year university until 1969 and a small number did not complete first year until 1970. Moreover, the distribution of first year grades in the University of Alberta undergraduate population changed quite noticeably from one year to another. Therefore, it is invalid to compare subjects' distribution of first year grades with the population distribution of first year grades from any single year. Calculation of a weighted distribution, and from it a weighted mean, proved necessary.

A similar situation exists with respect to the most recent measure of achievement, 1970 university average. The majority of subjects were in third year university in 1970. However, sizeable numbers were in second year and a small number were in first year. Again, weighted population values were necessary.

An example is given to illustrate the method of calculation of a weighted population distribution:

First, the proportions of the sample who completed first year in 1968, 1969, or 1970 were computed (Table E-1). The first year distributions for each of those years was multiplied by the appropriate proportion, then the results for each distribution class (9's, 8's, . . .) were summed to arrive at a weighted percentage for that class (Table E-2). The sum of all classes of the weighted distribution should equal 100%. The weighted means are calculated from the weighted distributions by the common methods for treatment of grouped data. A similar calculation was performed to arrive at weighted distribution and mean for 1970 university average.

Table E-1

CALCULATION OF THE WEIGHT PROPORTIONS

Registration in First Year	Number	Proportion
1967 - 1968	94	.752
1968 - 1969	21	.168
1969 - 1970	10	.080
Totals	125	1.000

Table E-2

CALCULATION OF A WEIGHTED DISTRIBUTION

Mark	Population Values for each Year*			Weighted Value for each Year			Weighted Dist. %
	1968 %	1969 %	1970 %	1968	1969	1970	
9	2.9	3.4	3.7	2.18	0.57	0.30	3.0
8	8.7	10.4	10.8	6.53	1.75	0.86	9.2
7	18.8	20.3	20.5	14.14	3.41	1.64	19.2
6	25.3	25.1	24.3	18.03	4.22	1.94	25.2
5	21.1	19.3	19.2	15.88	3.24	1.54	20.6
4	13.3	11.6	11.9	10.00	1.95	0.95	12.9
3	5.2	5.0	5.1	3.91	0.84	0.41	5.2
2	3.2	2.9	3.2	2.41	0.49	0.26	3.2
1	1.5	1.4	1.4	1.13	0.24	0.11	1.5
	100.0	99.4	100.0	75.21	16.71	8.01	100.0

*Obtained from the University of Alberta, computer print-out for distributions of grades.

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